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Tang et al.

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(45) **Date of Patent: *Sep. 5, 2017**

(54) **OPTICAL IMAGE CAPTURING SYSTEM**

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(73) Assignee: **ABILITY OPTO-ELECTRONICS TECHNOLOGY CO., LTD.**, Taichung (TW)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

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(22) Filed: **Dec. 18, 2015**

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US 2017/0068071 A1 Mar. 9, 2017

(30) **Foreign Application Priority Data**

Sep. 3, 2015 (TW) .... 104129228 A

(51) **Int. Cl.**

G02B 3/02	(2006.01)
G02B 13/00	(2006.01)
G02B 5/20	(2006.01)
G02B 27/64	(2006.01)

(52) **U.S. Cl.**

CPC ***G02B 13/0045*** (2013.01); *G02B 5/208* (2013.01); *G02B 27/646* (2013.01)

(58) **Field of Classification Search**

CPC G02B 13/0045
USPC 359/713
See application file for complete search history.

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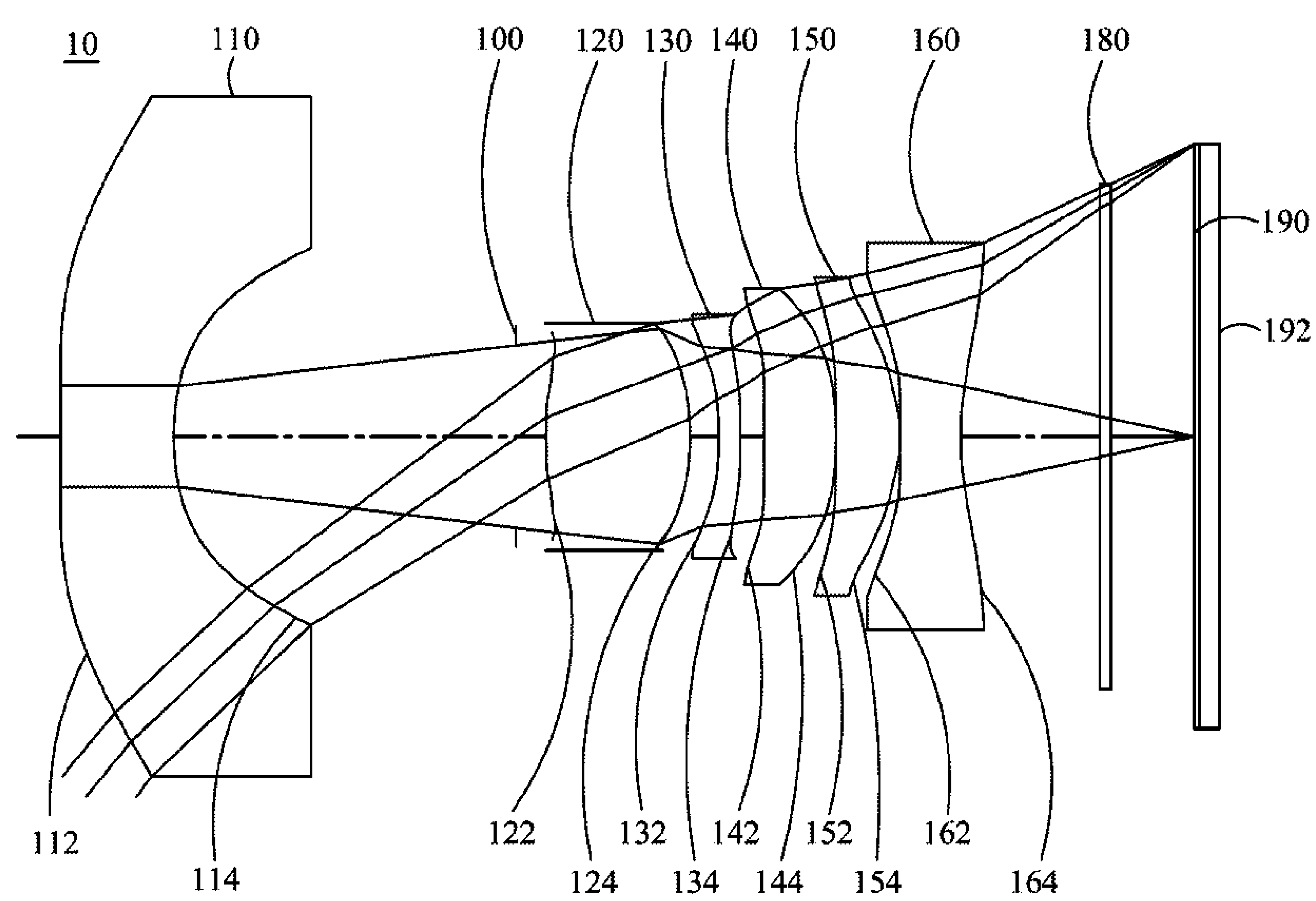
Primary Examiner — James Jones
(74) *Attorney, Agent, or Firm* — Muncy, Geissler, Olds & Lowe, P.C.

(57) **ABSTRACT**

A six-piece optical lens for capturing image and a six-piece optical module for capturing image are provided. In order from an object side to an image side, the optical lens along the optical axis includes a first lens with refractive power, a second lens with refractive power, a third lens with refractive power, a fourth lens with refractive power, a fifth lens with refractive power and a sixth lens with refractive power. At least one of the image-side surface and object-side surface of each of the six lens elements is aspheric. The optical lens can increase aperture value and improve the imagining quality for use in compact cameras.

25 Claims, 24 Drawing Sheets



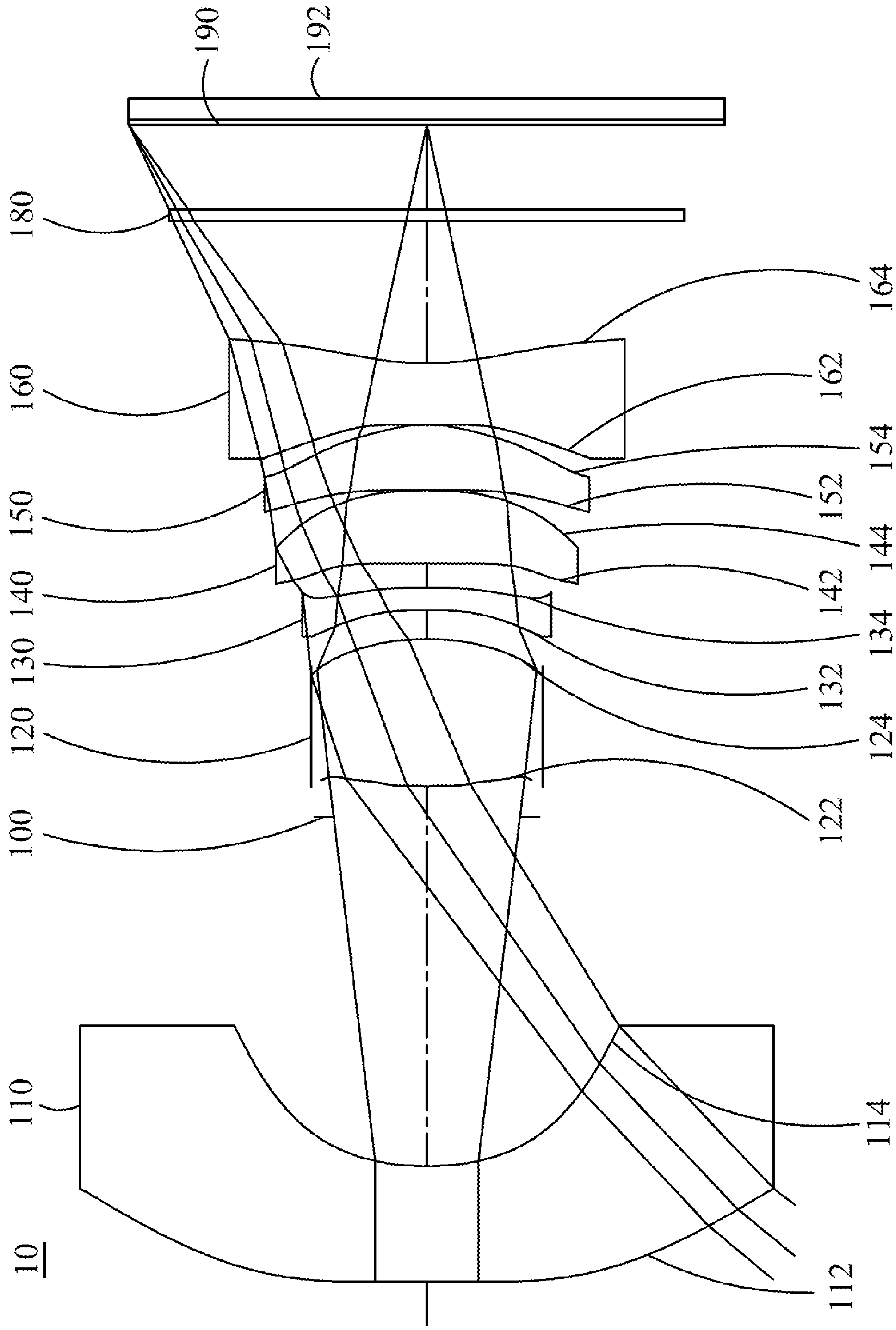

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FIG. 1A

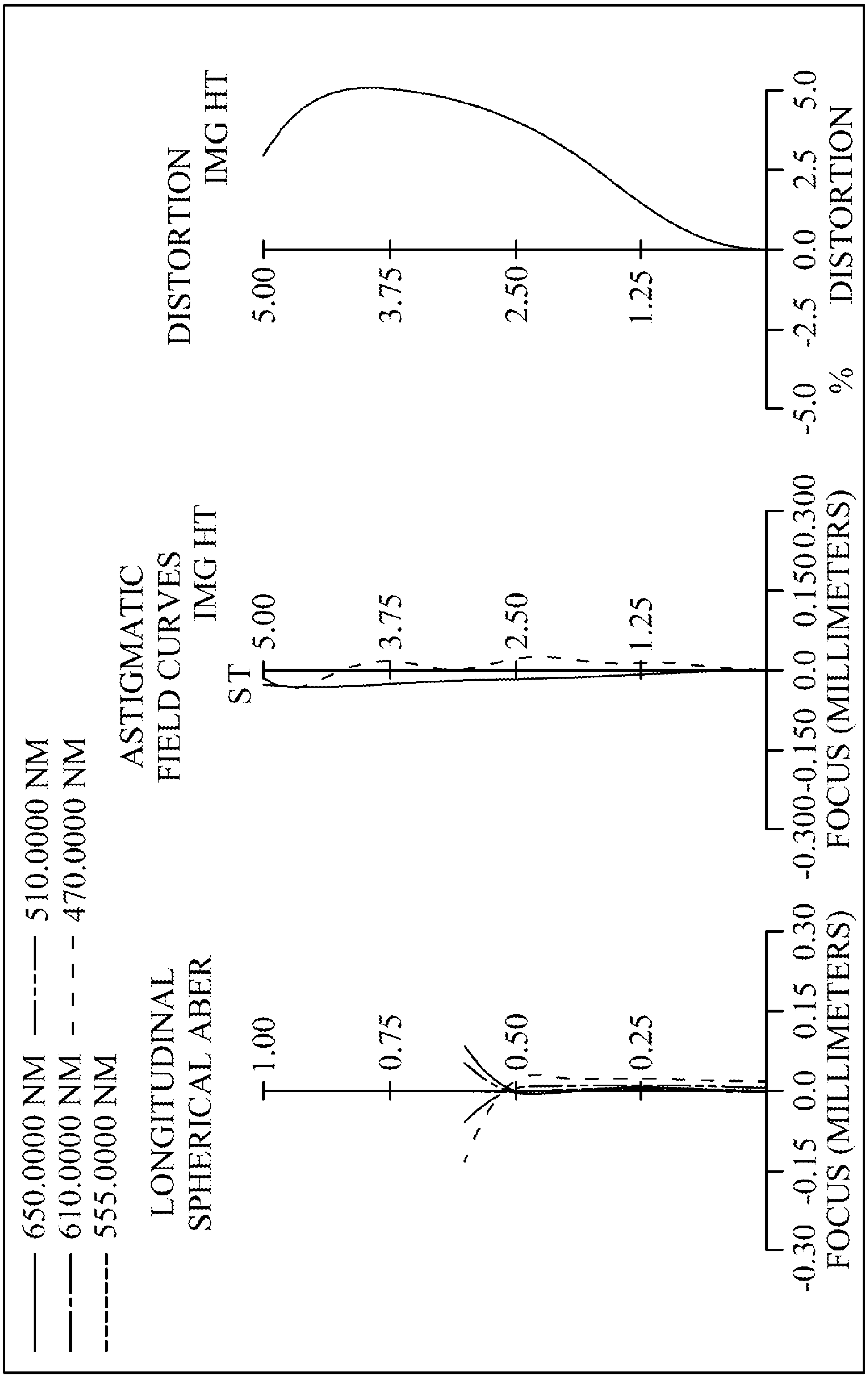
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FIG. 1B

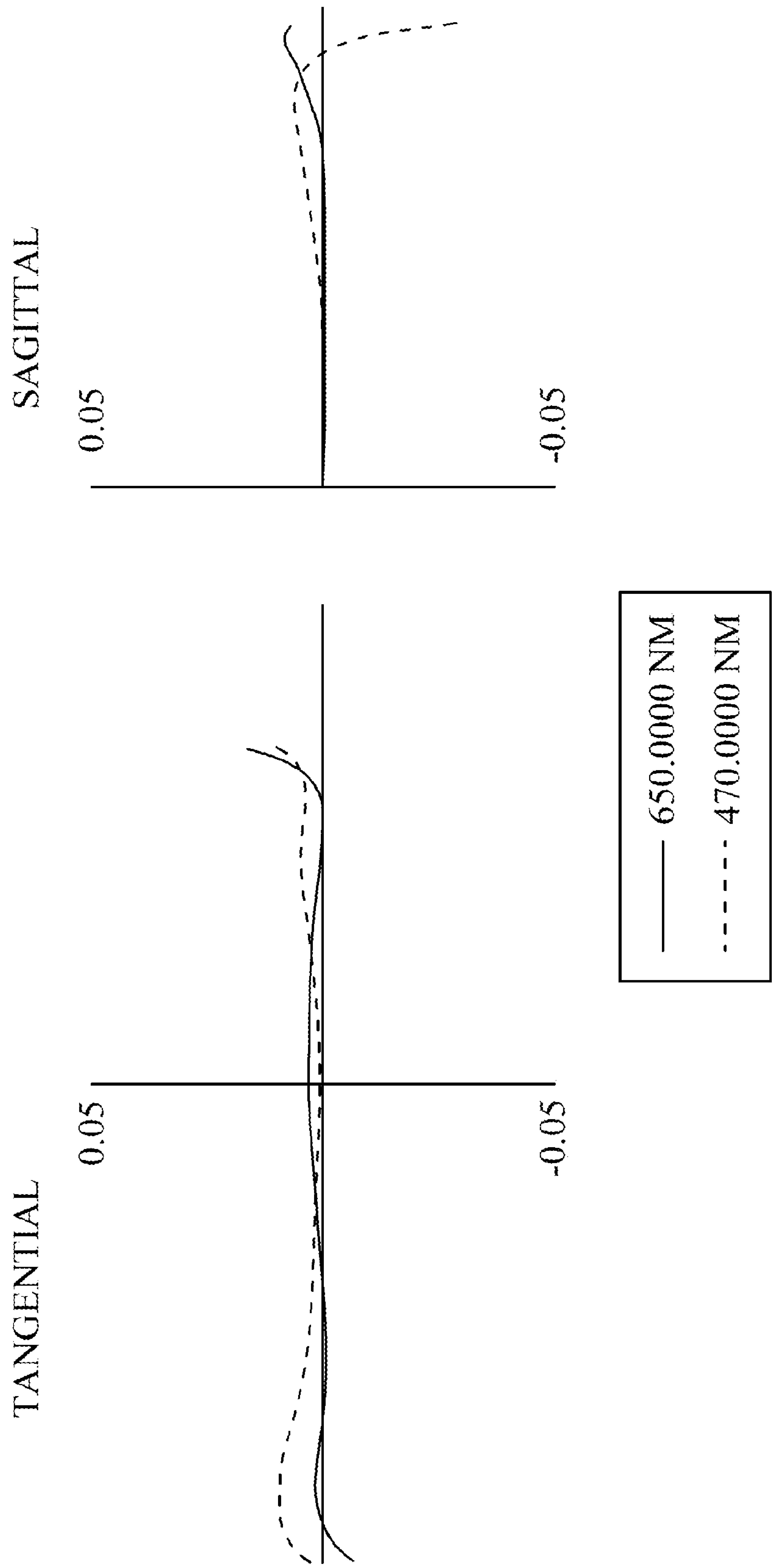

FIG. 1C

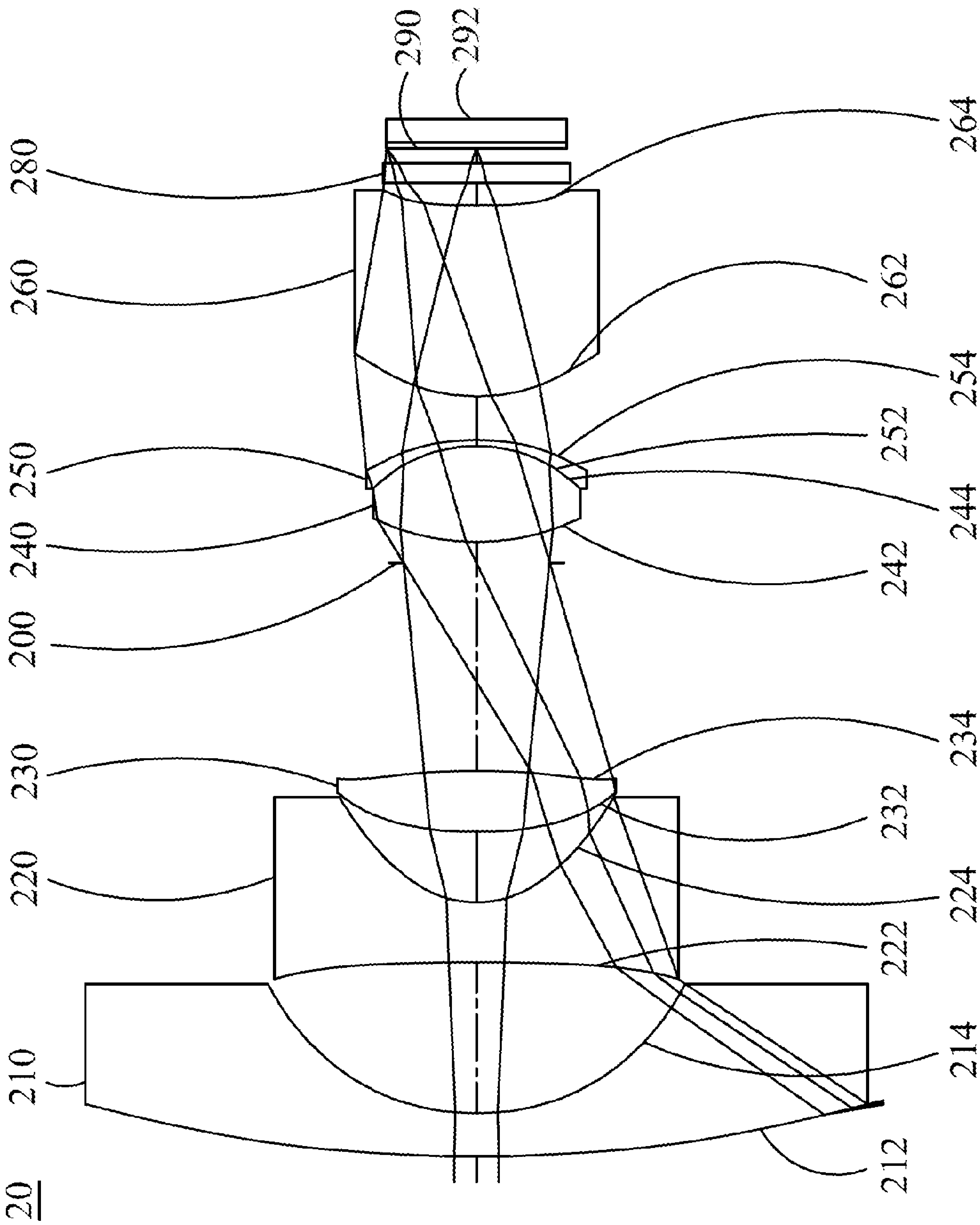
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FIG. 2A

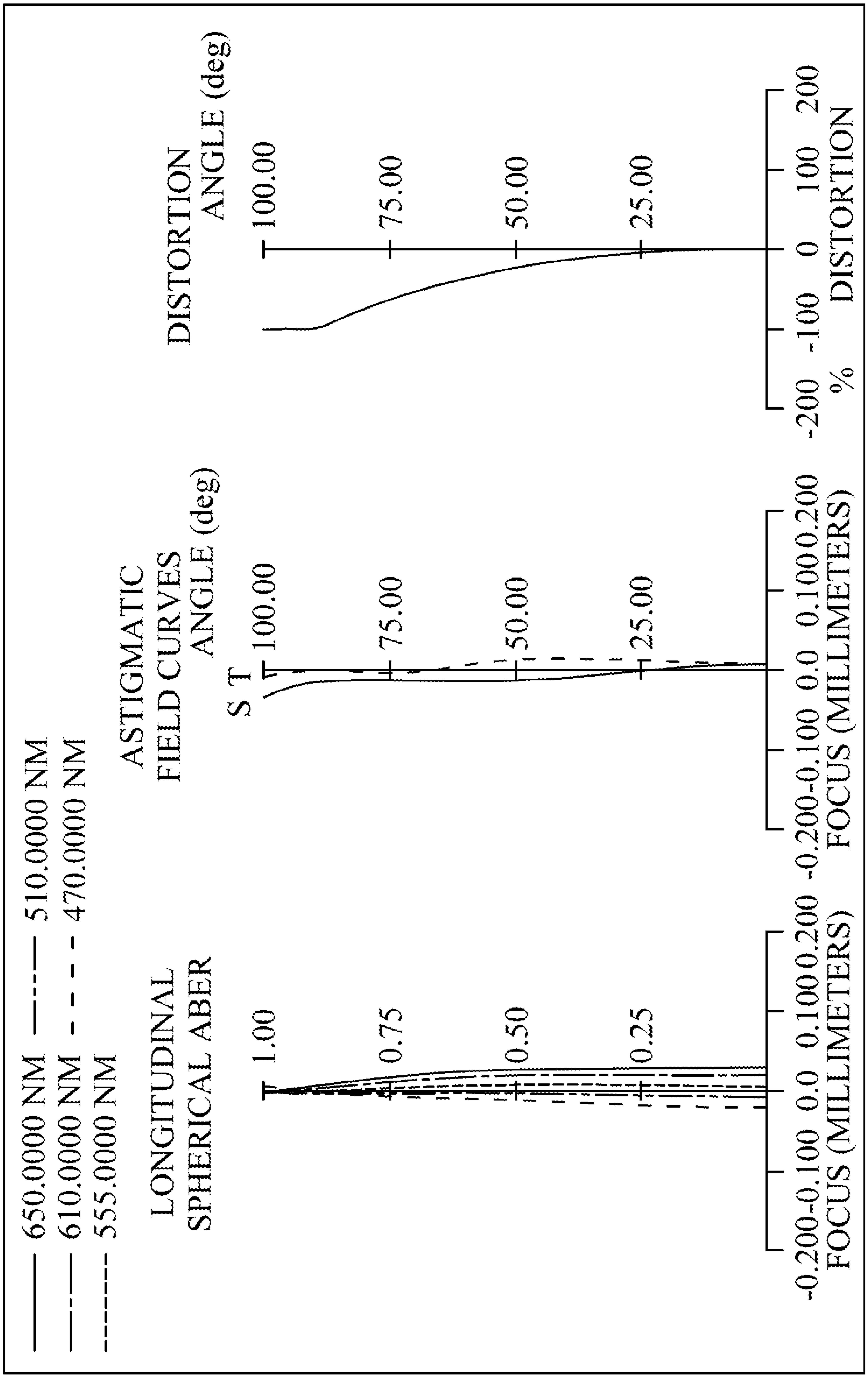
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FIG. 2B

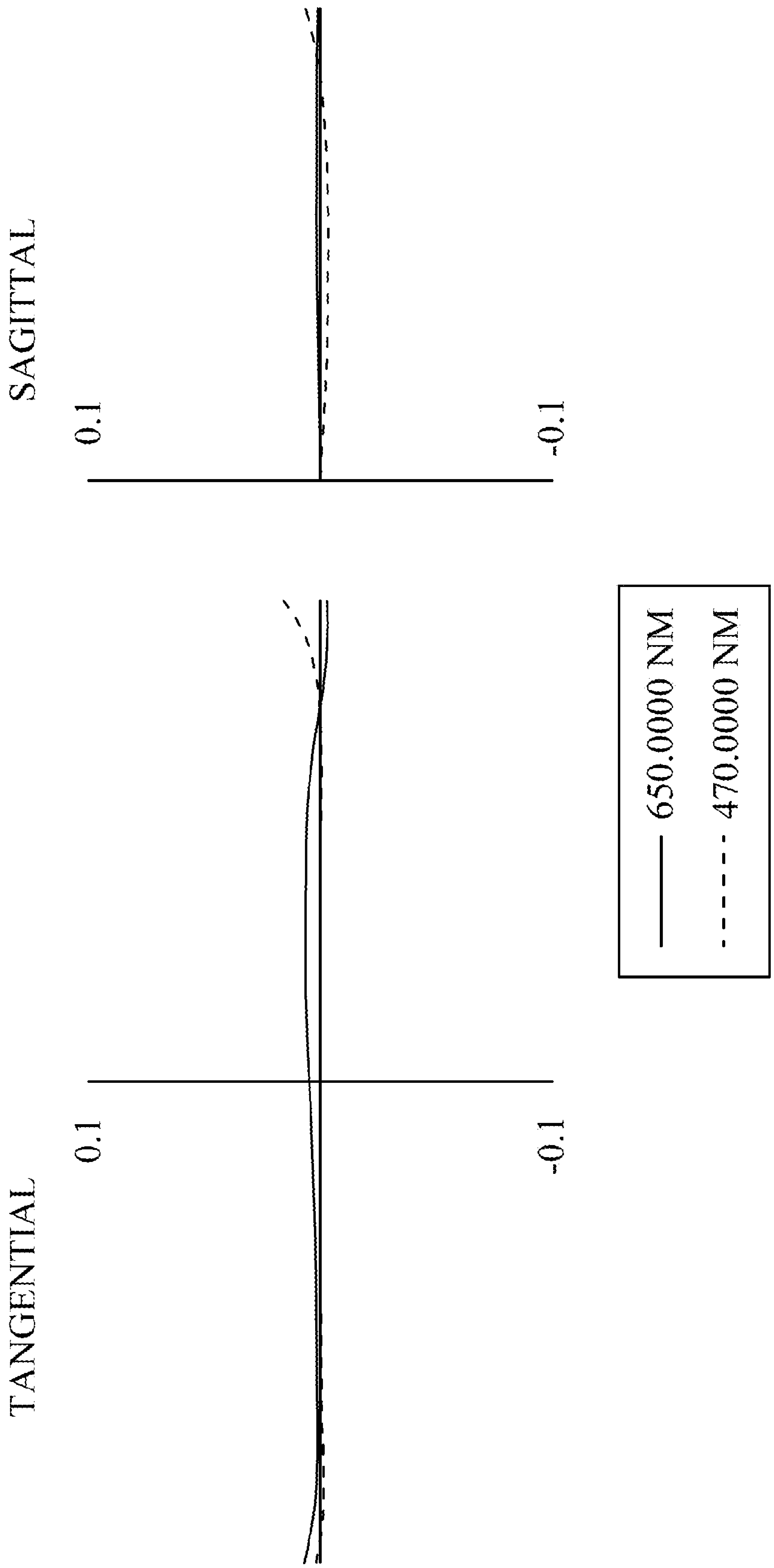

FIG. 2C

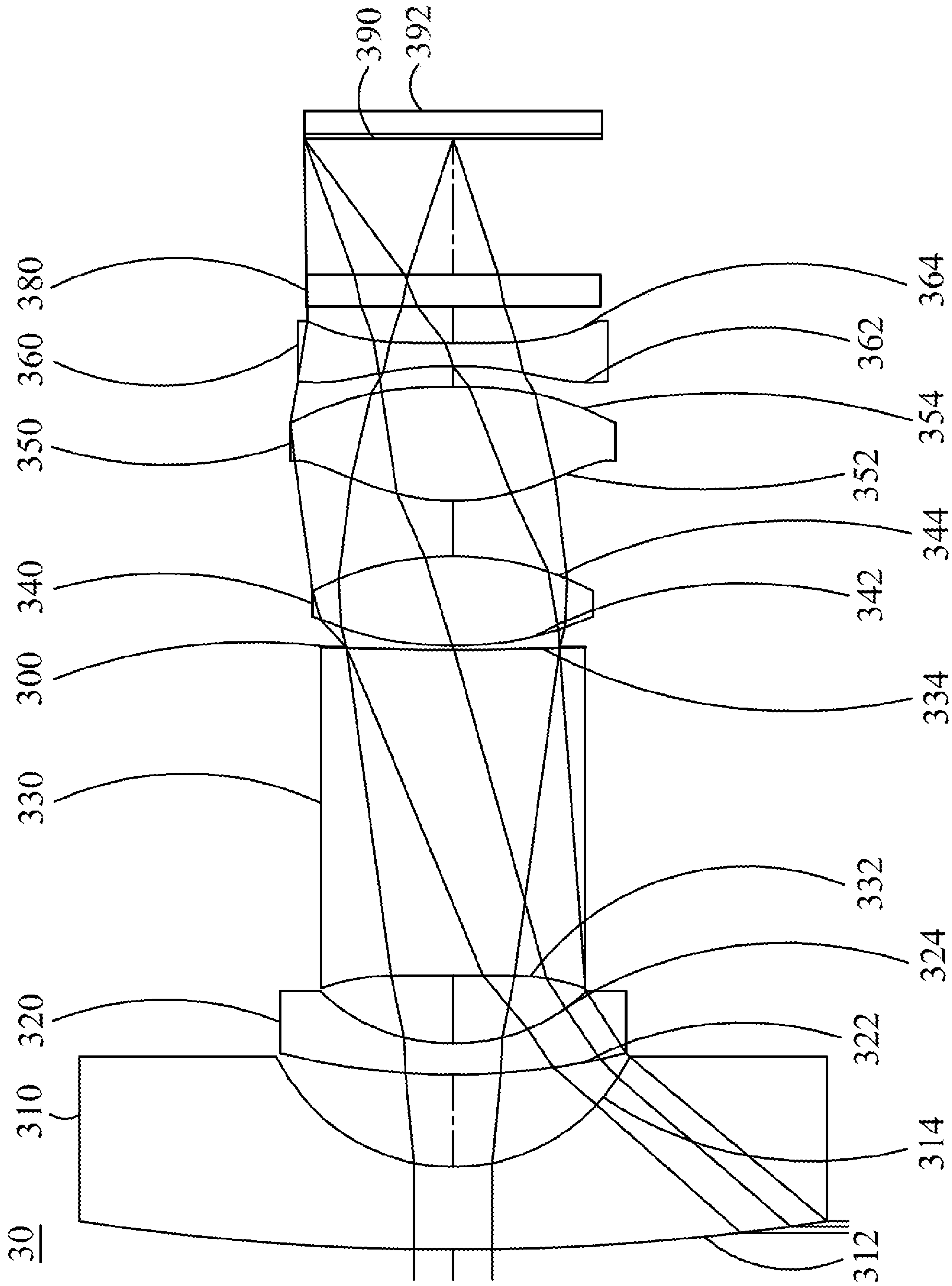
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FIG. 3A

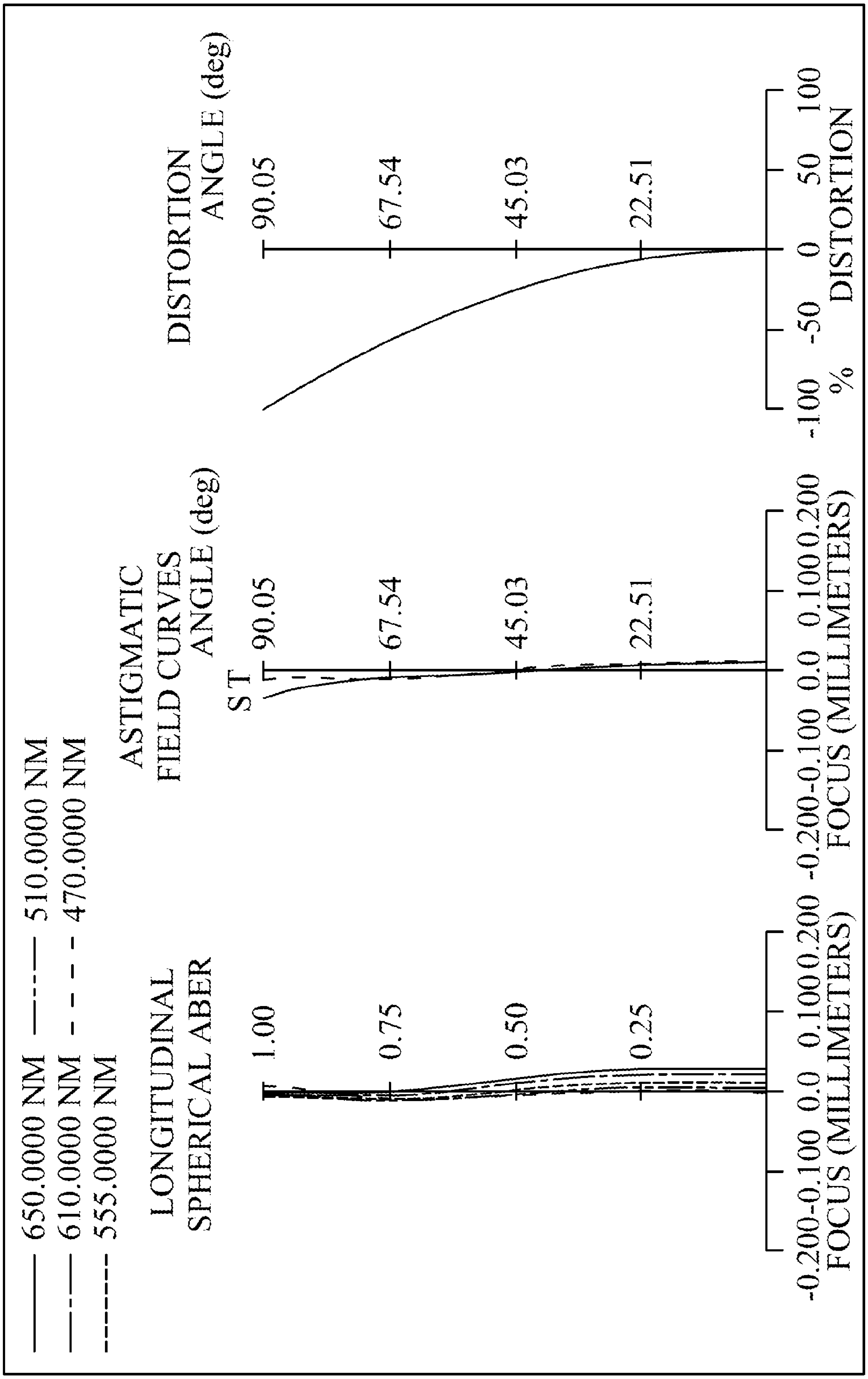
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FIG. 3B

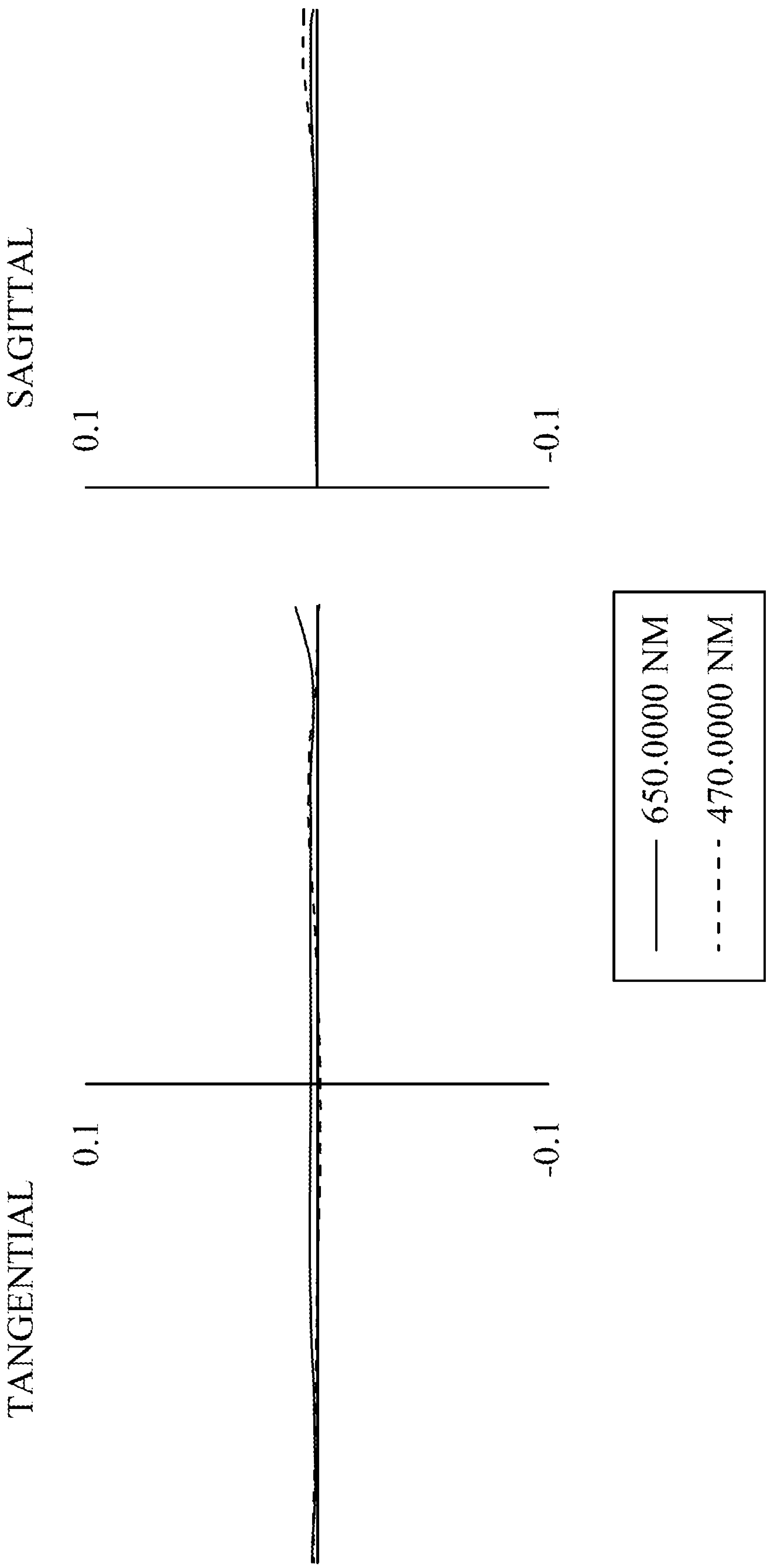

FIG. 3C

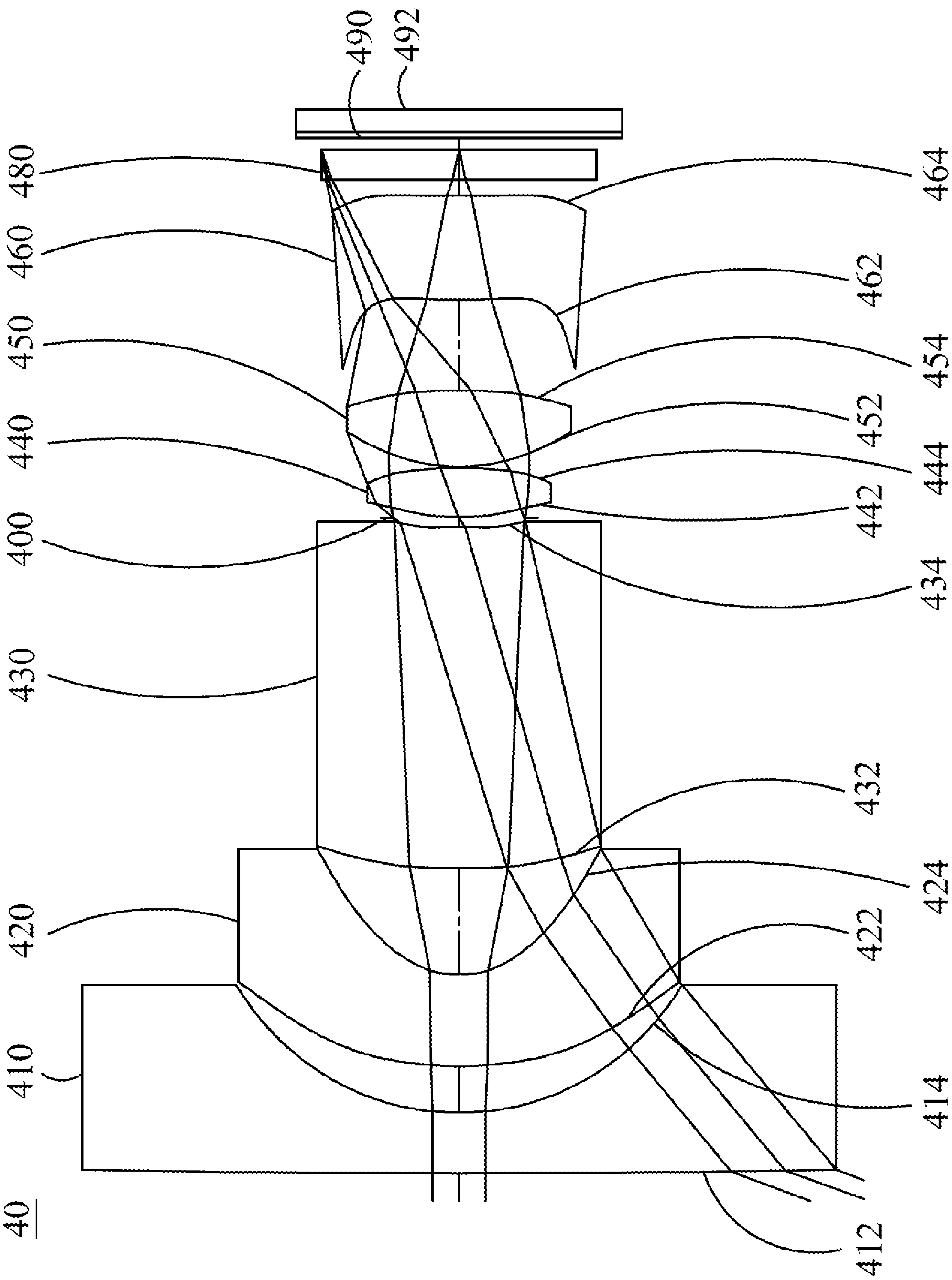
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FIG. 4A

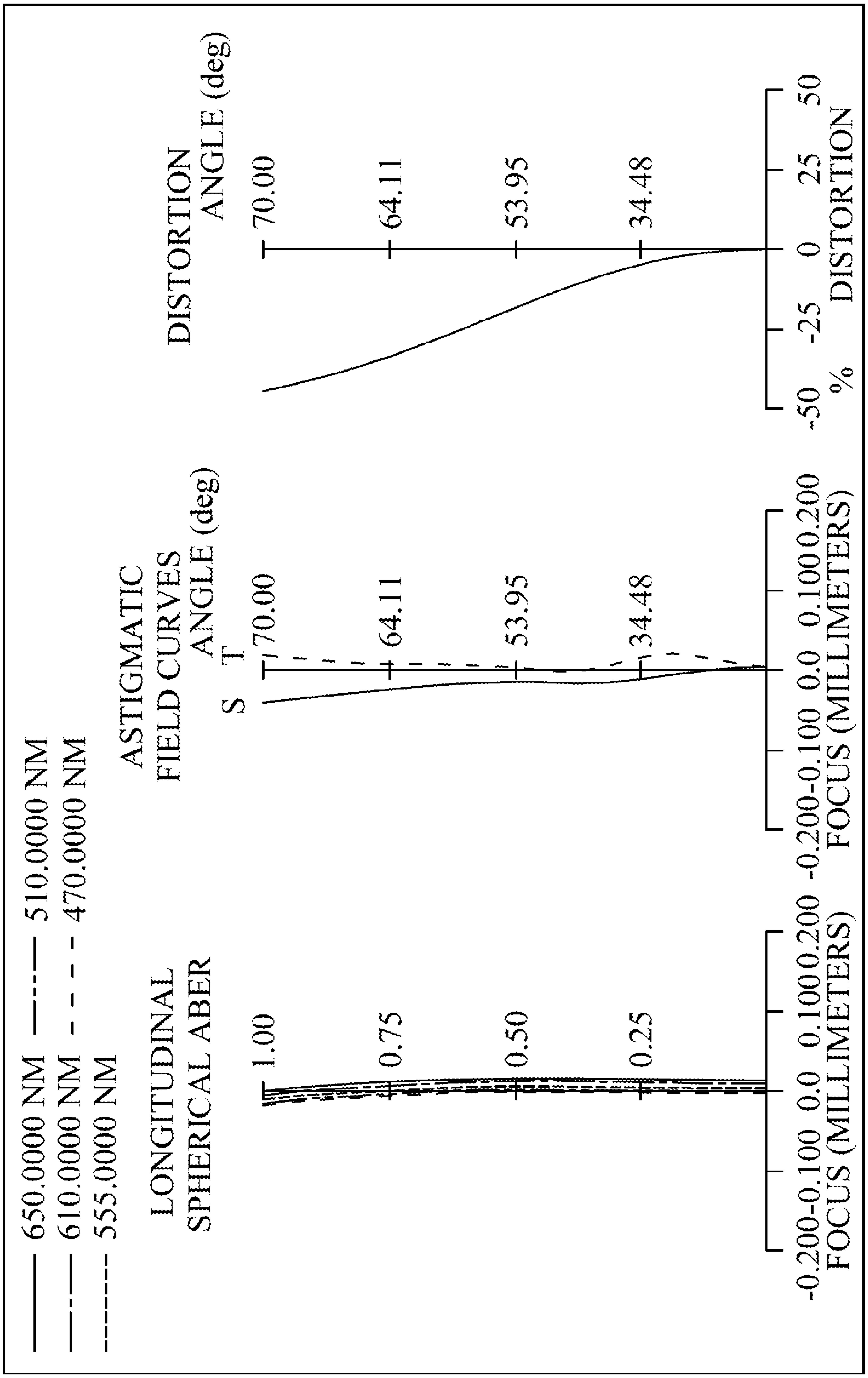
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FIG. 4B

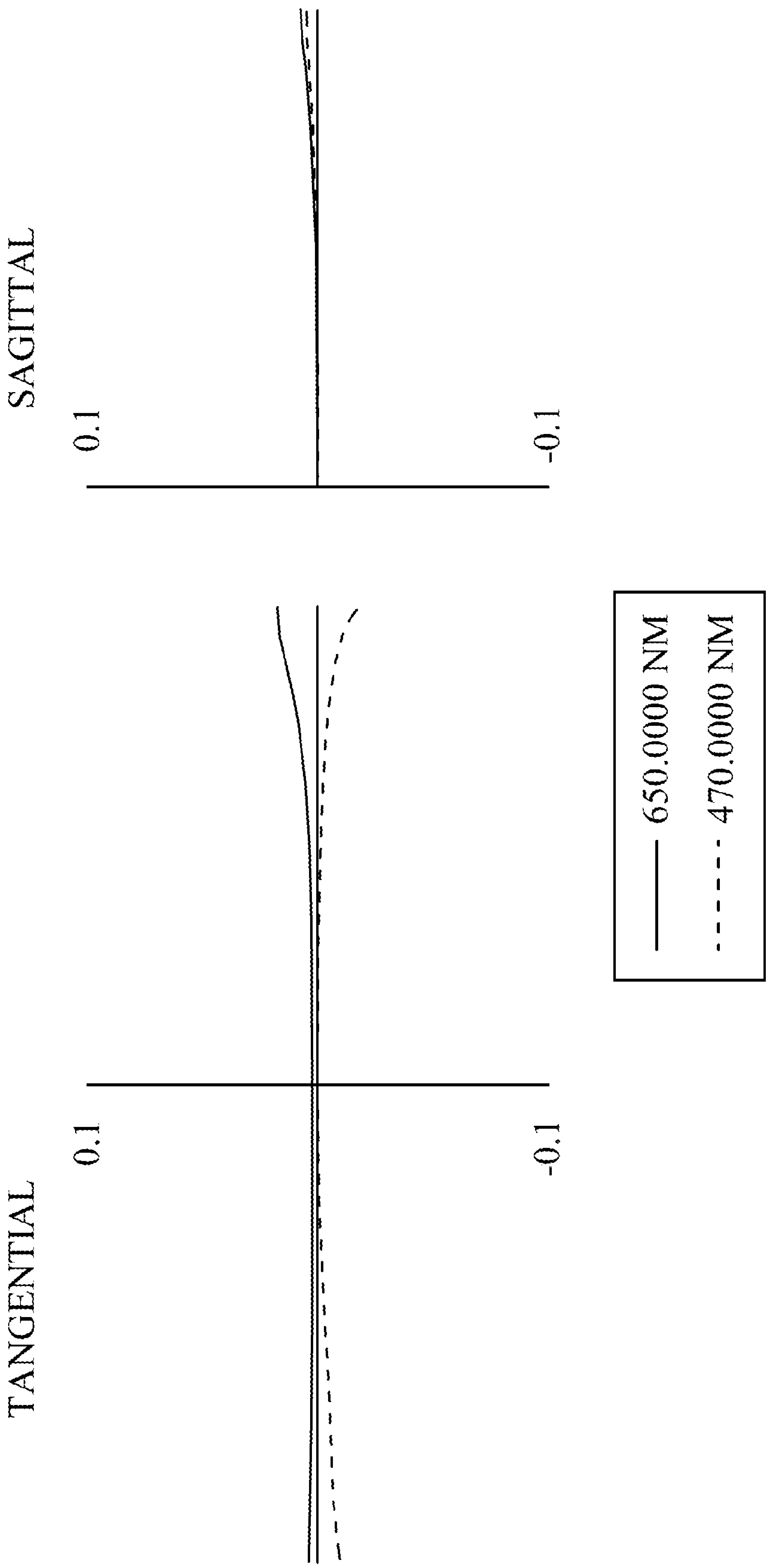

FIG. 4C

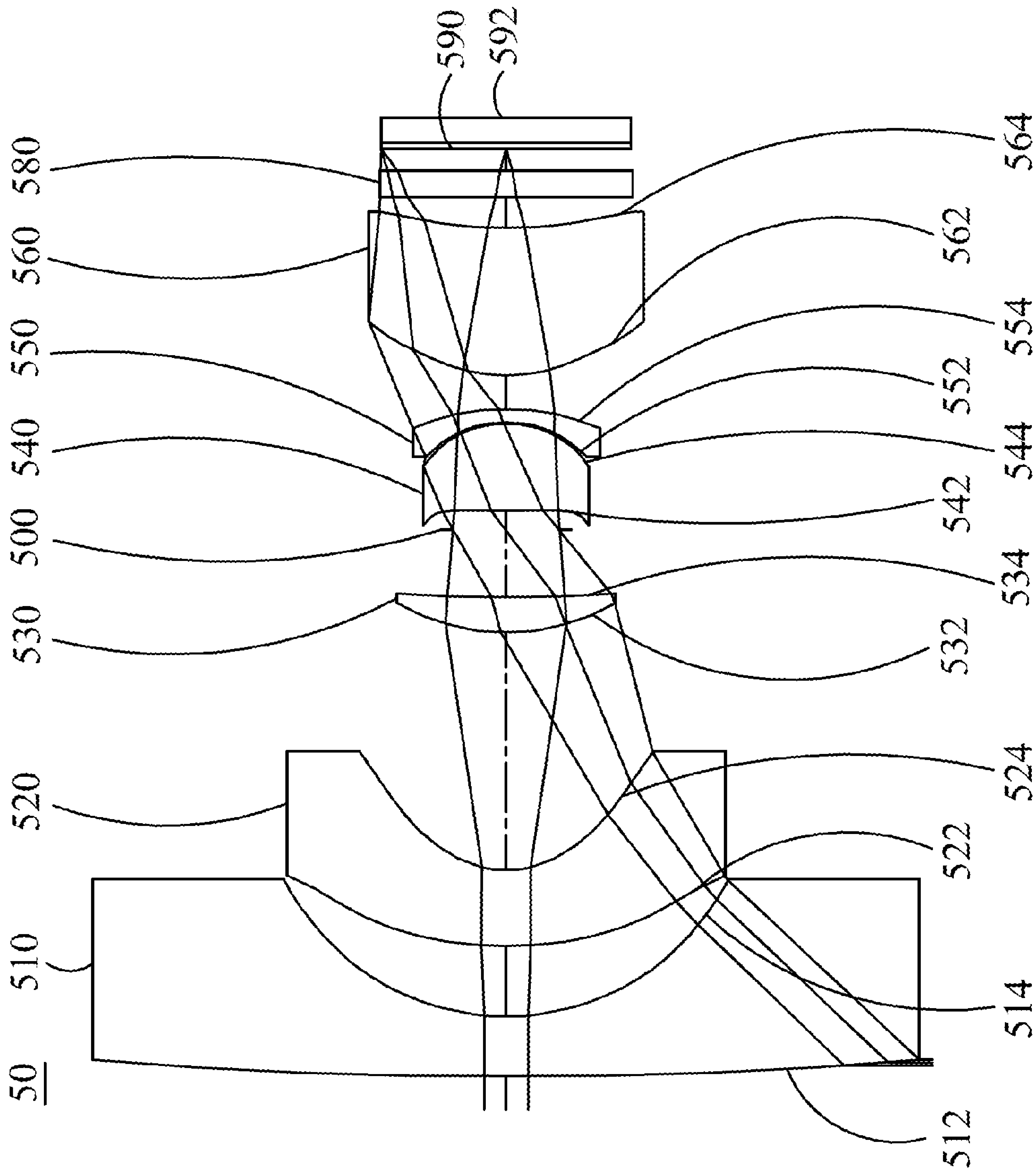
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FIG. 5A

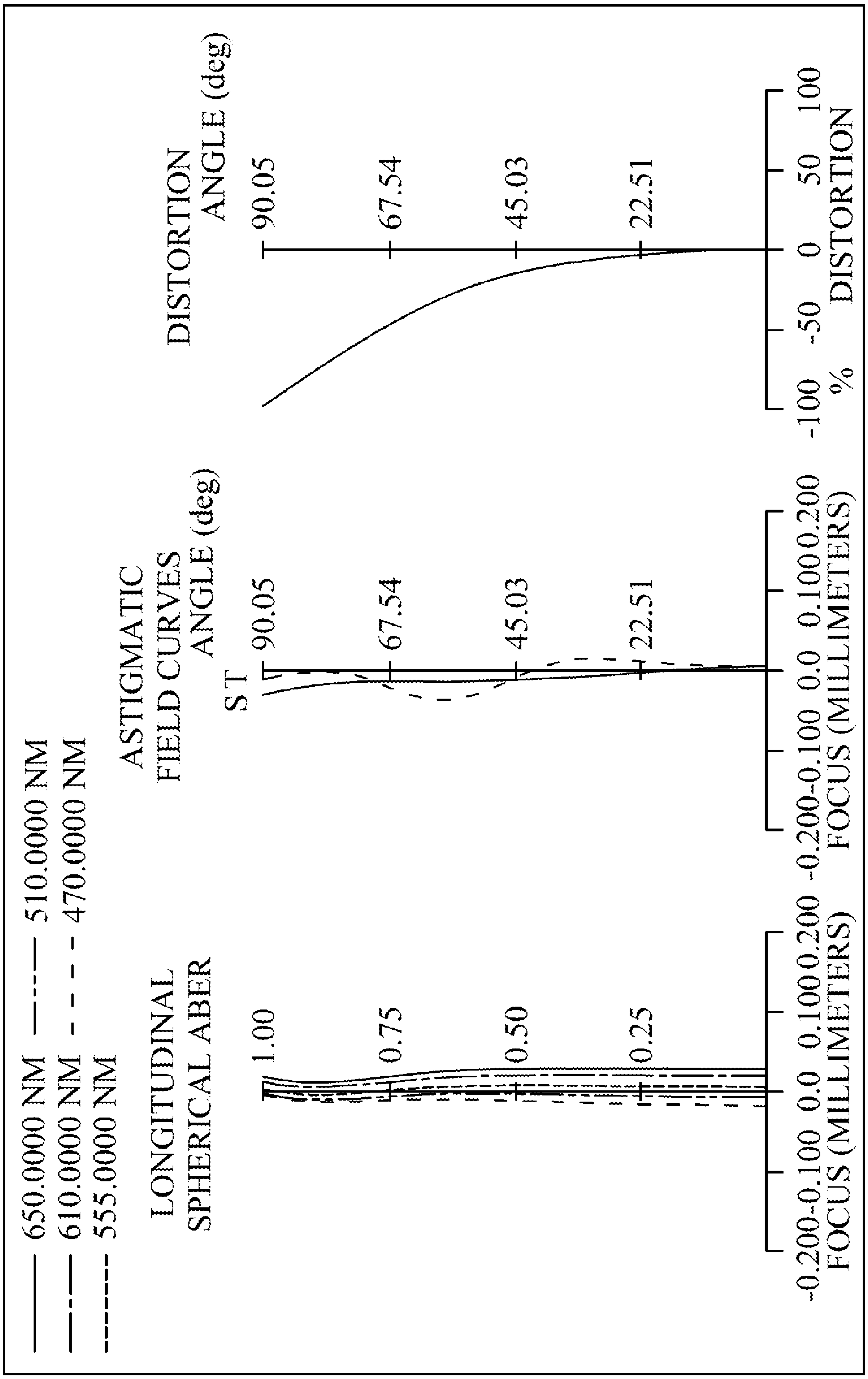
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FIG. 5B

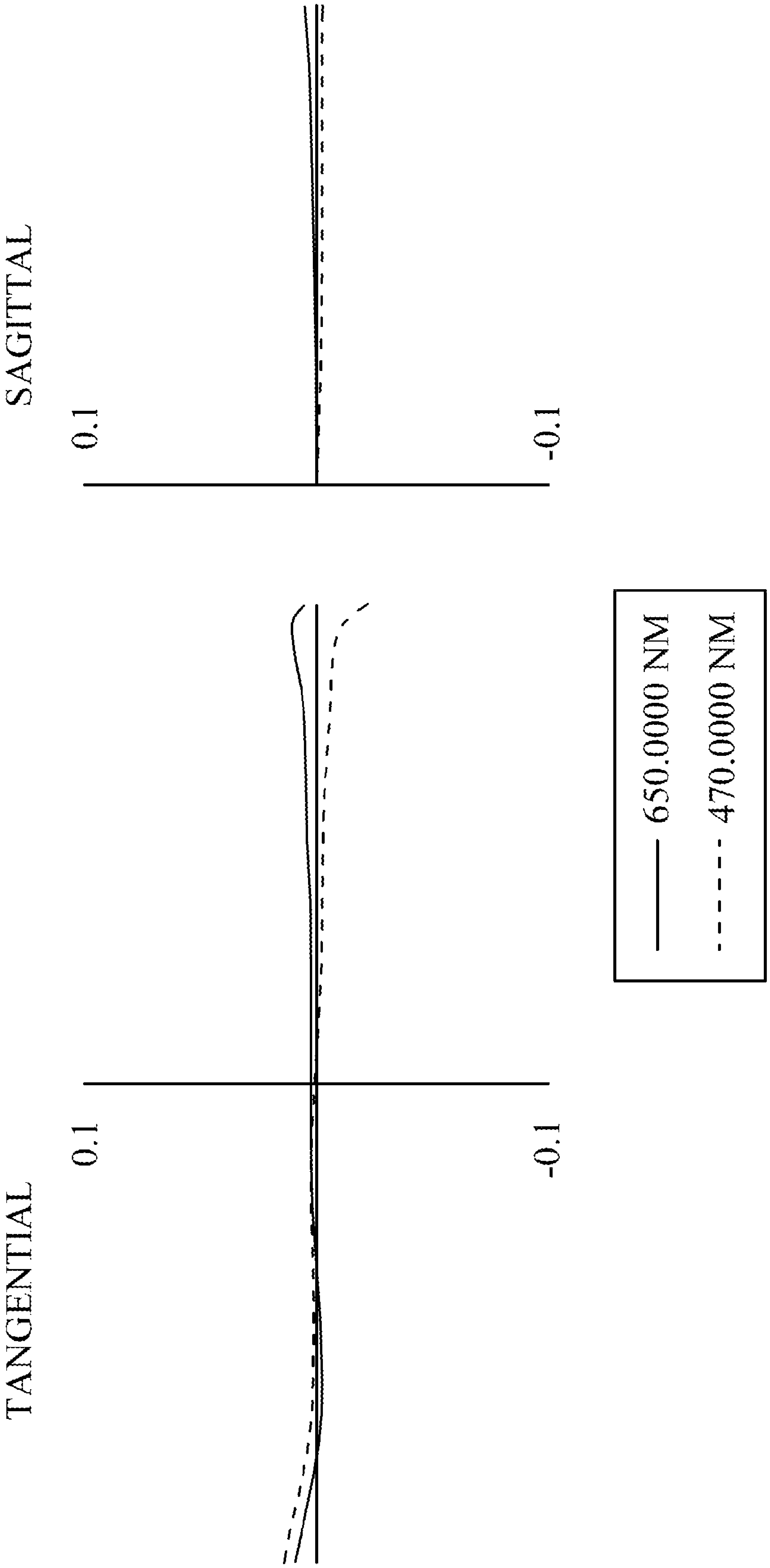

FIG. 5C

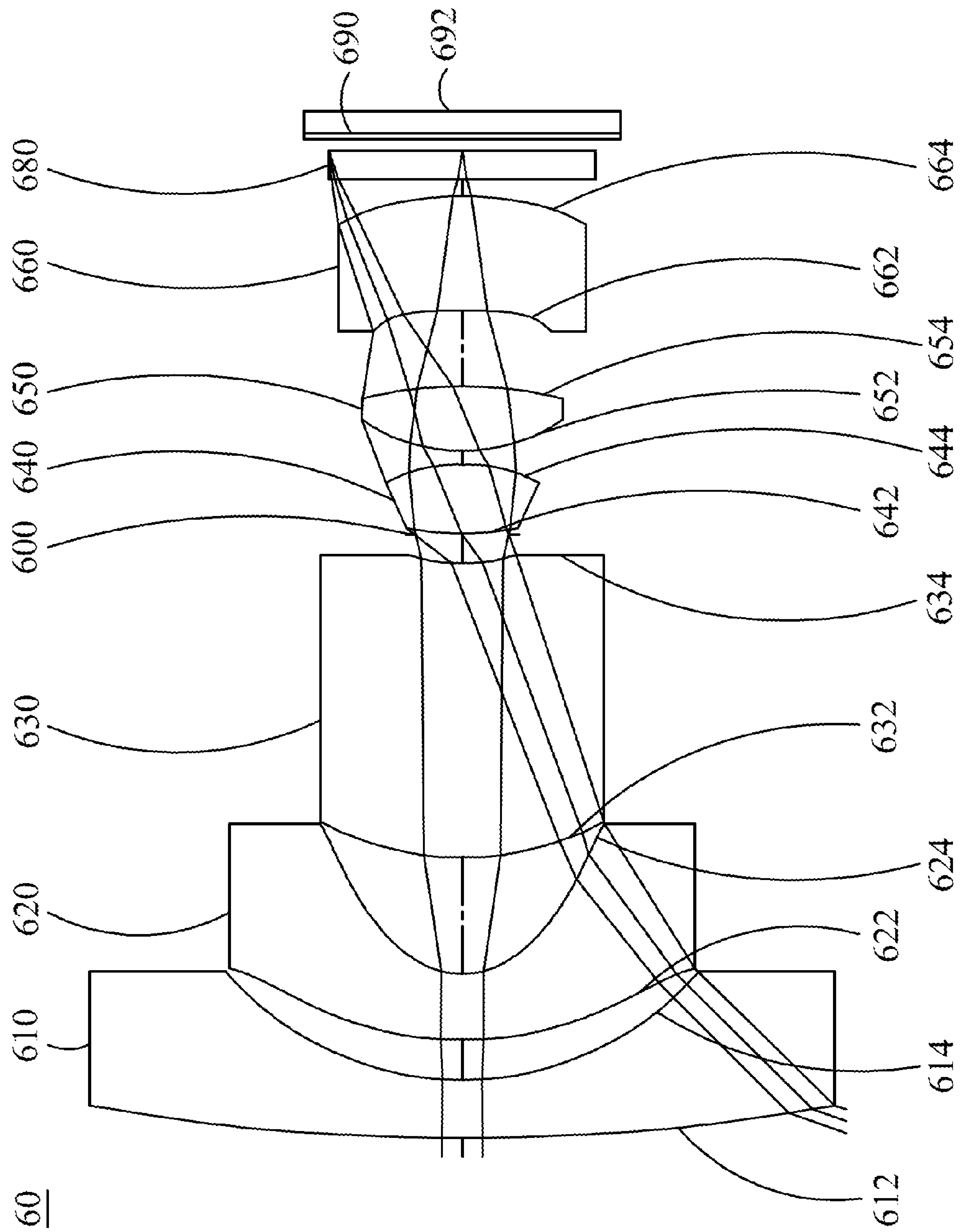
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FIG. 6A

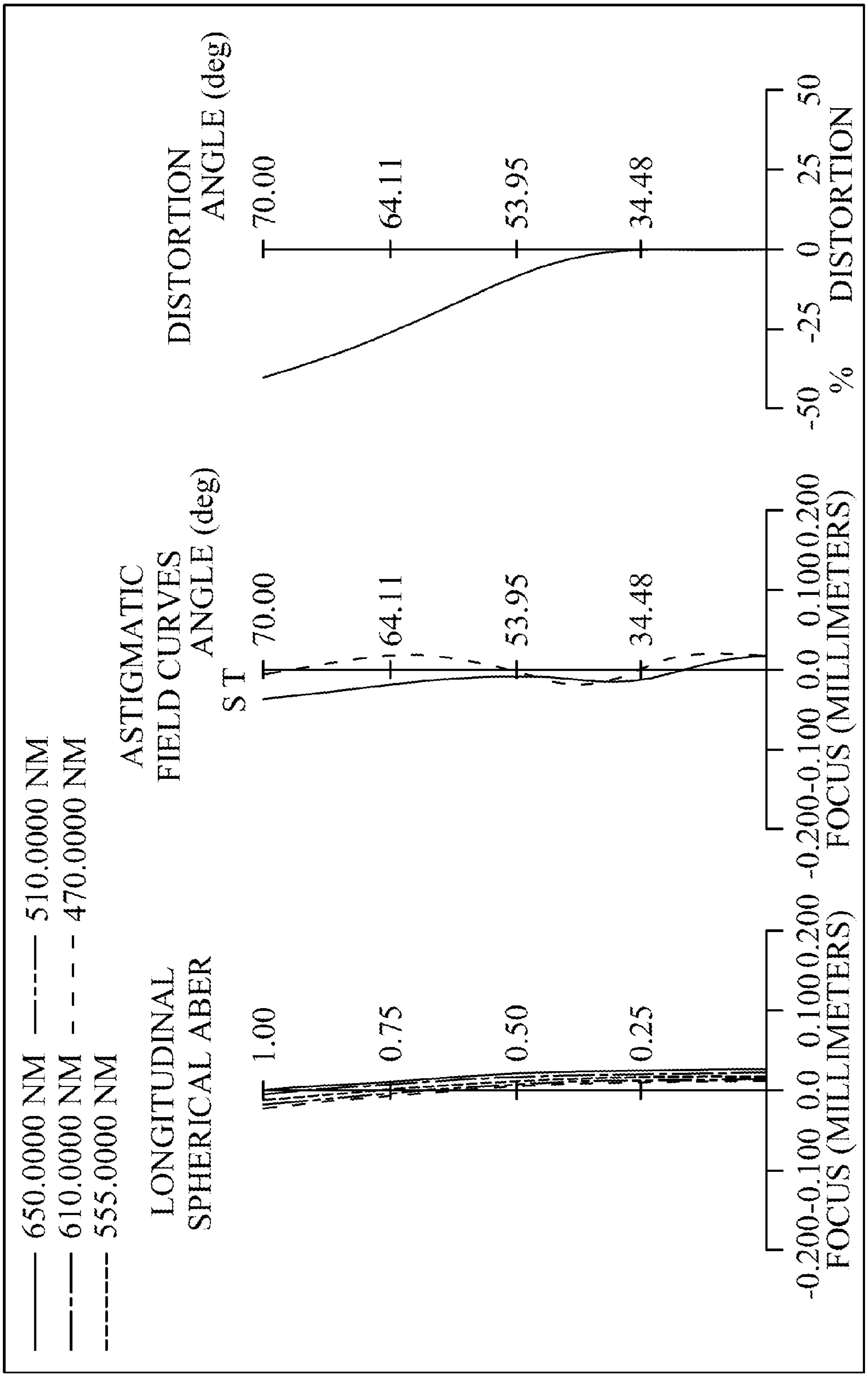
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FIG. 6B

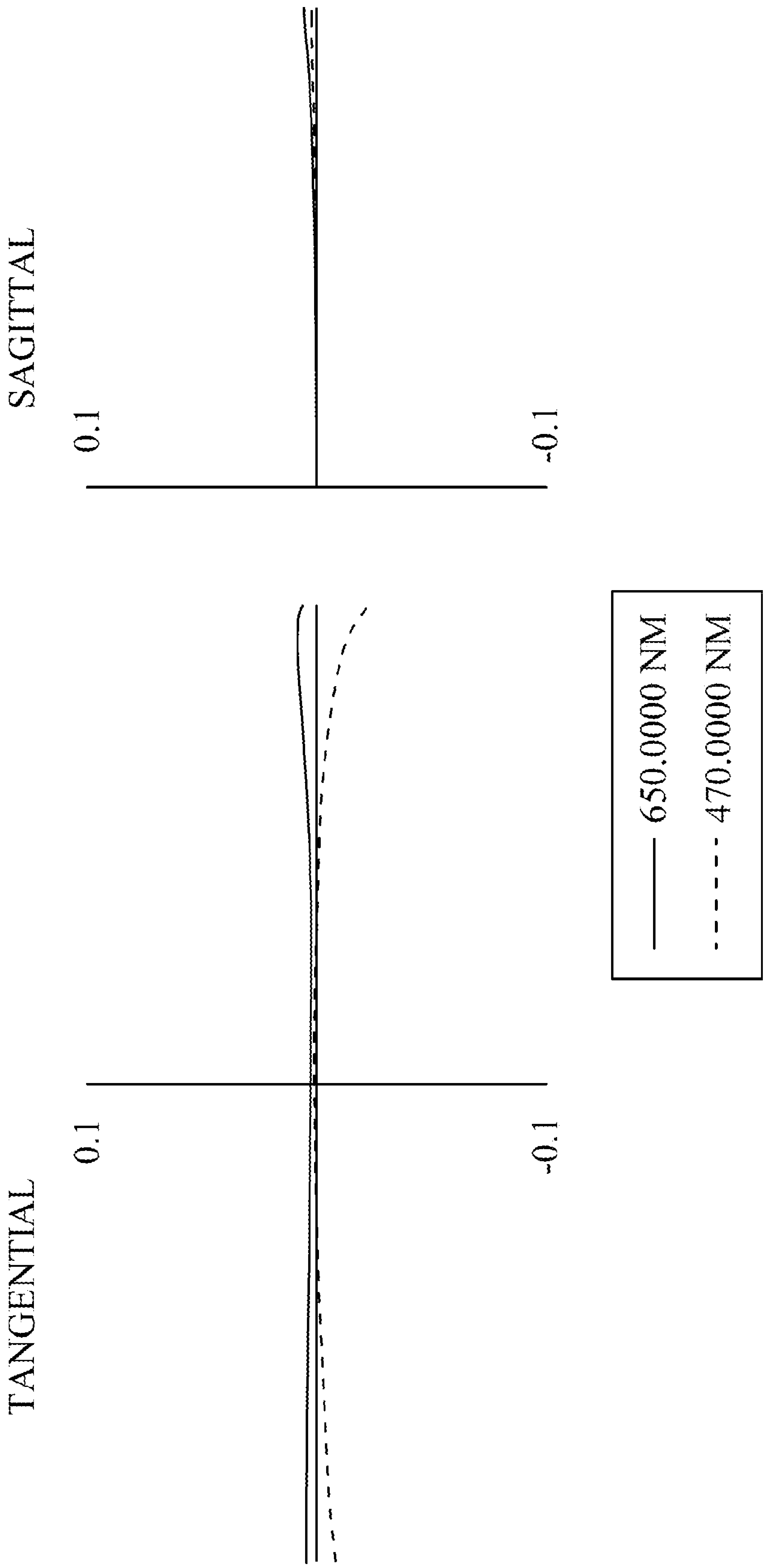

FIG. 6C

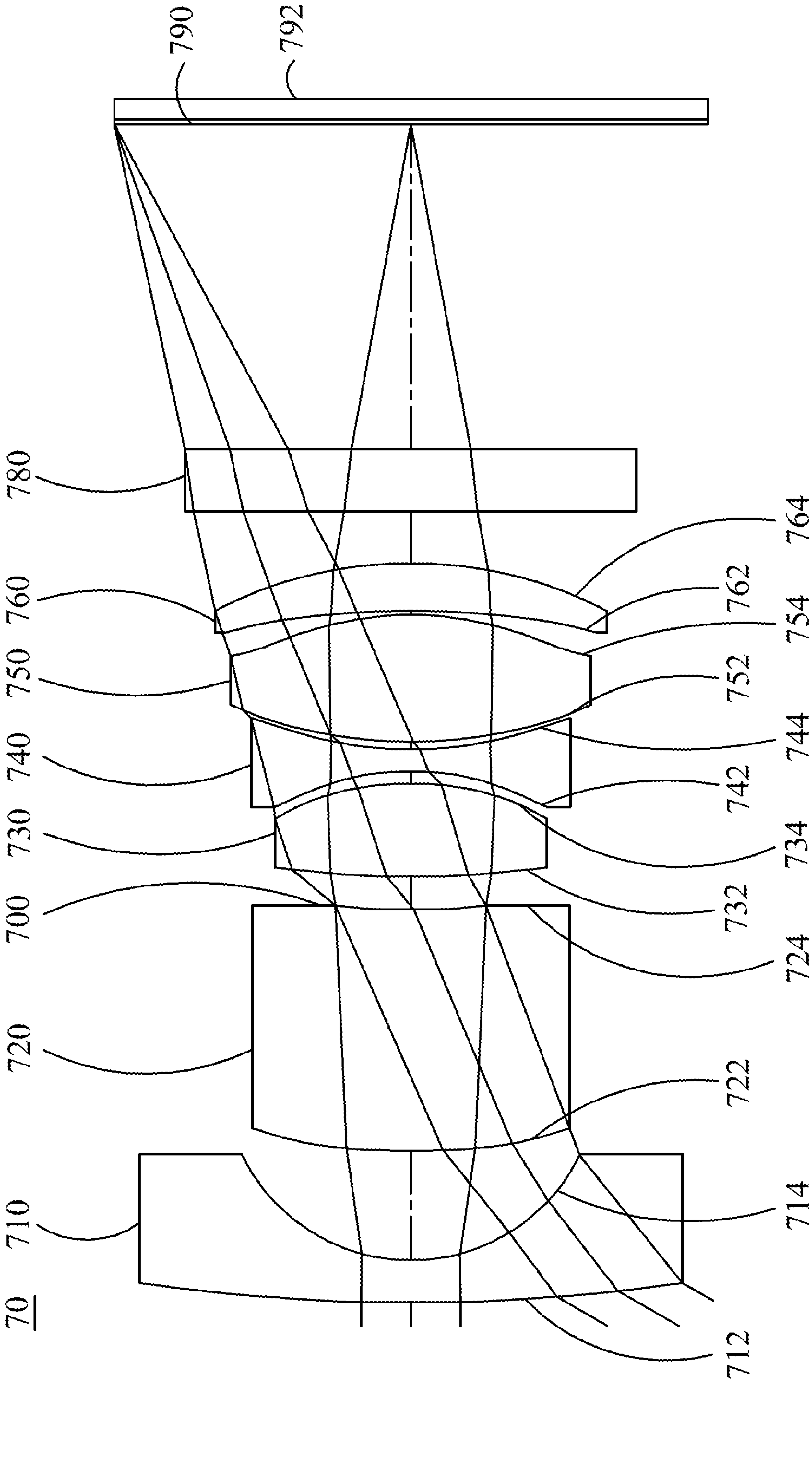
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FIG. 7A

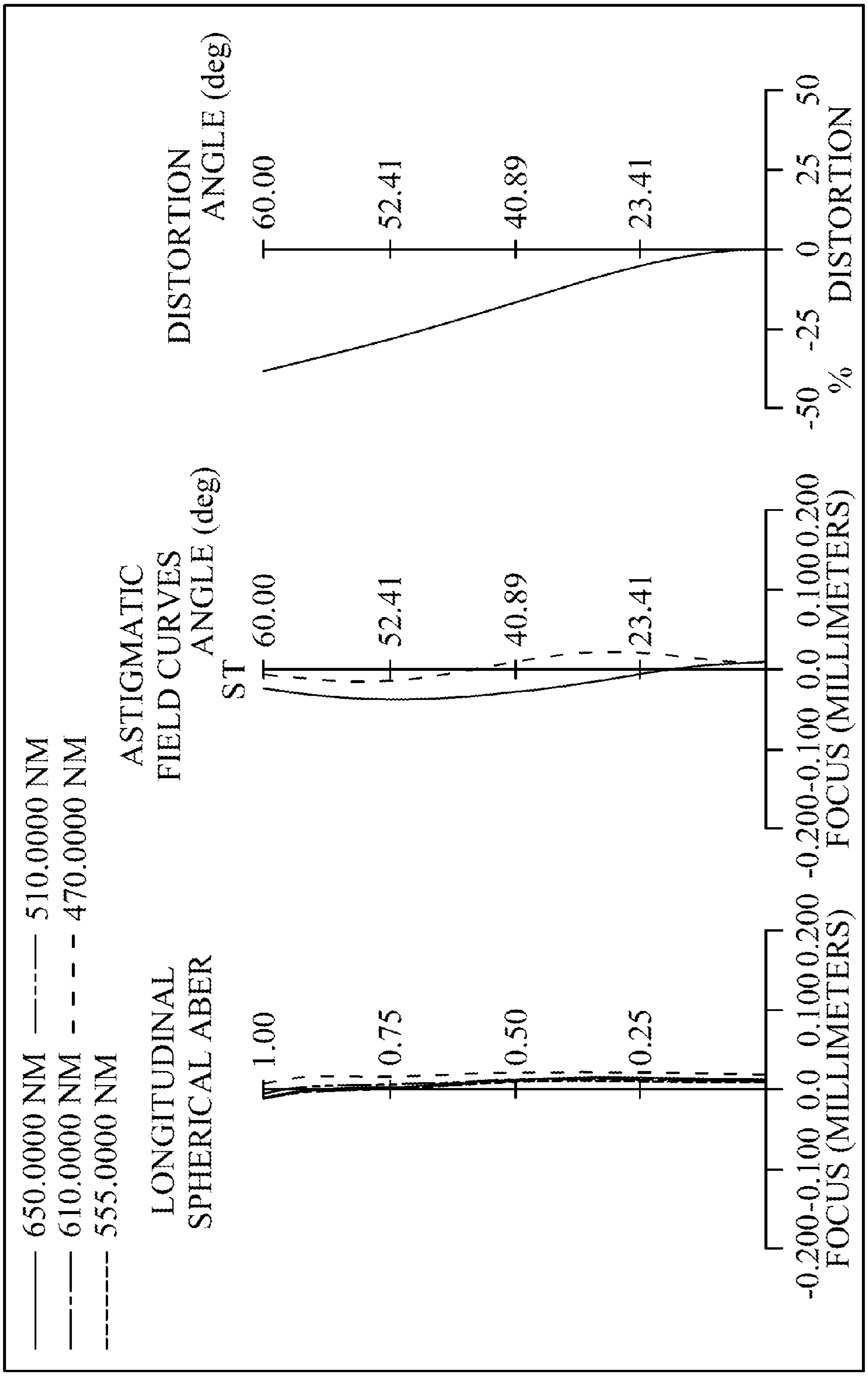
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FIG. 7B

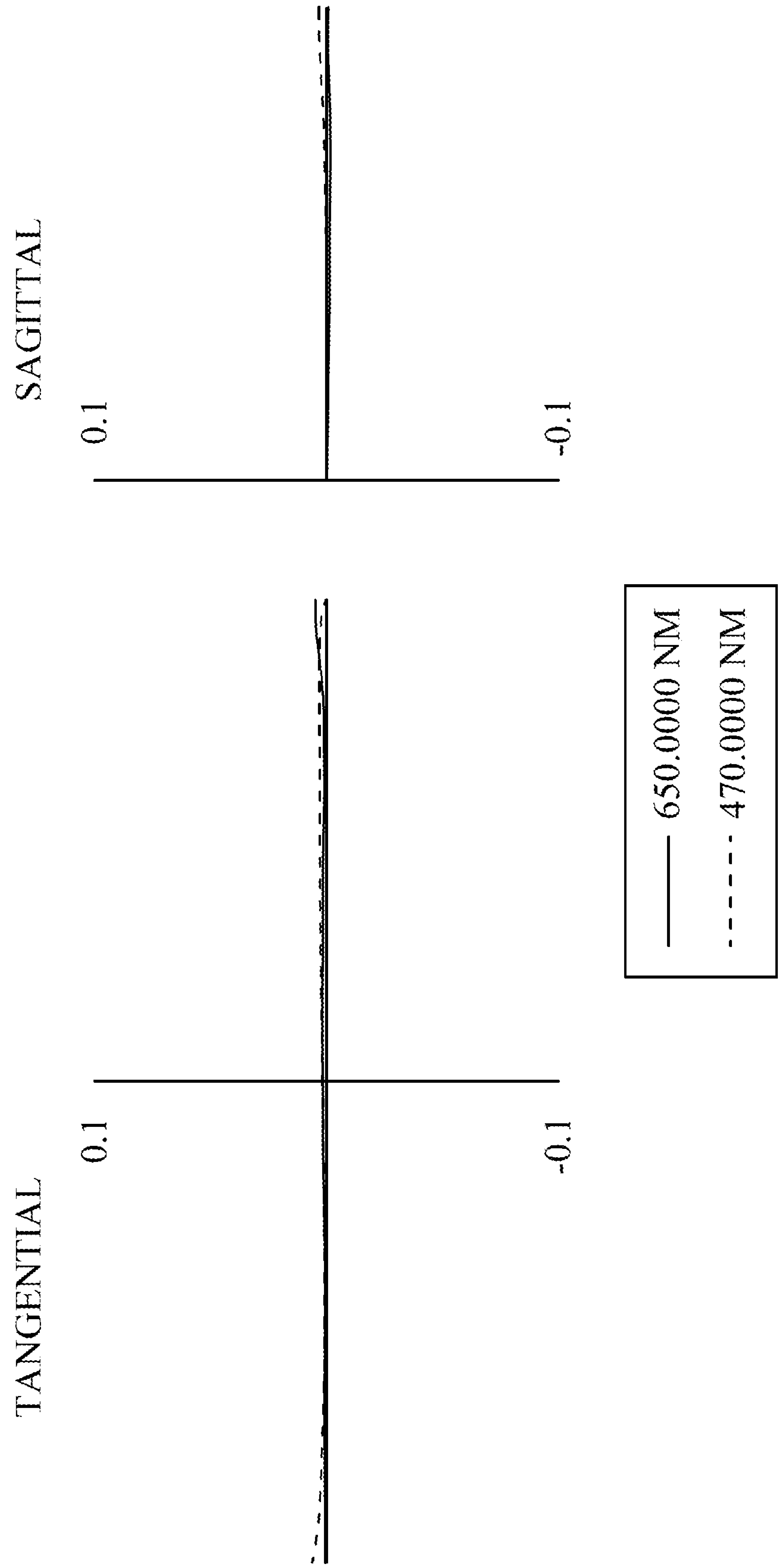

FIG. 7C

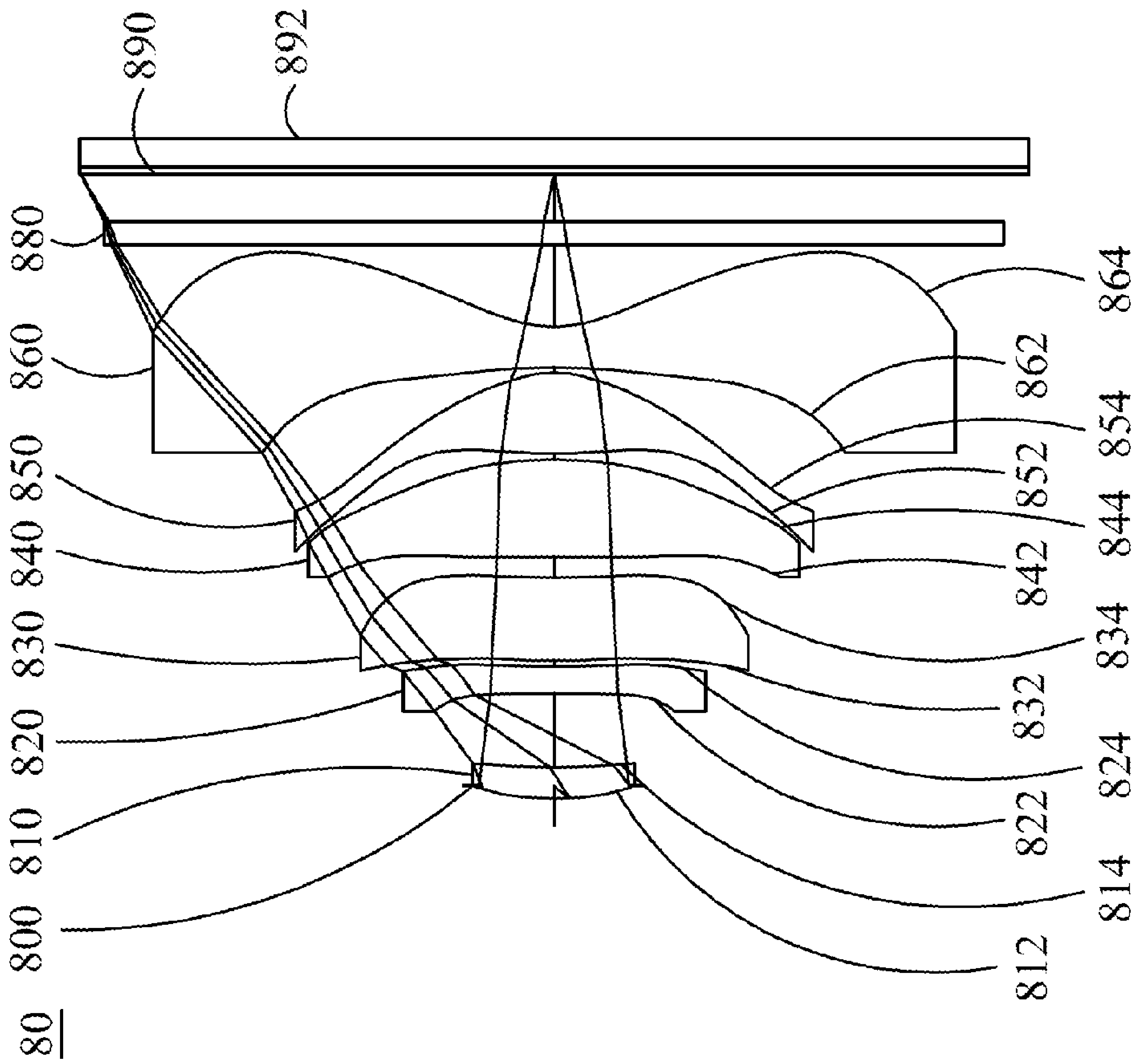
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FIG. 8A

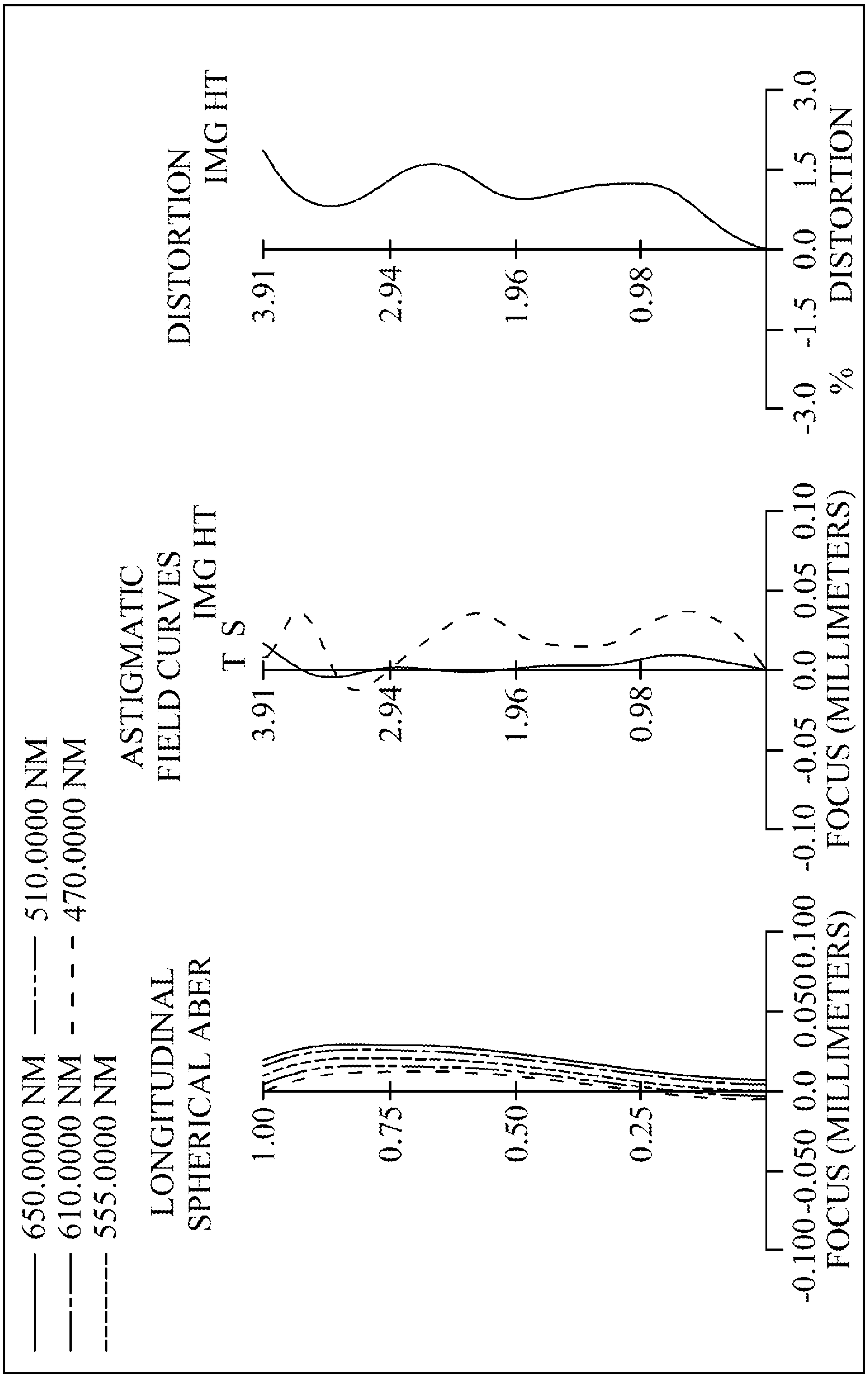
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FIG. 8B

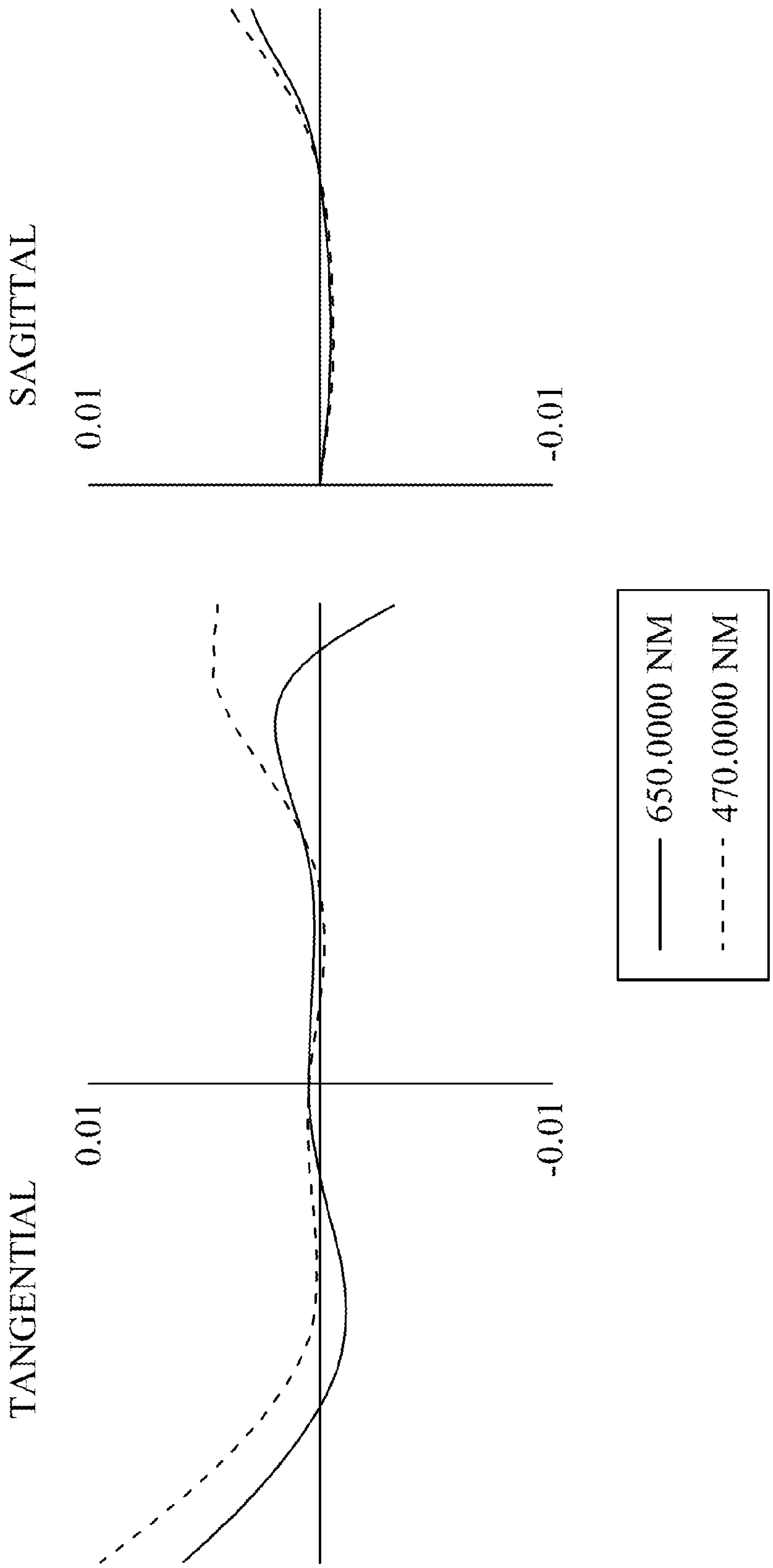

FIG. 8C

OPTICAL IMAGE CAPTURING SYSTEM

CROSS-REFERENCE TO RELATED APPLICATION

This application claims the benefit of Taiwan Patent Application No. 104129228, filed on Sep. 3, 2015, in the Taiwan Intellectual Property Office, the disclosure of which is incorporated herein in its entirety by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present disclosure relates to an optical image capturing system, and more particularly to a compact optical image capturing system which can be applied to electronic products.

2. Description of the Related Art

In recent years, with the rise of portable electronic devices having camera functionalities, the demand for an optical image capturing system is raised gradually. The image sensing device of ordinary photographing camera is commonly selected from charge coupled device (CCD) or complementary metal-oxide semiconductor sensor (CMOS Sensor). In addition, as advanced semiconductor manufacturing technology enables the minimization of pixel size of the image sensing device, the development of the optical image capturing system directs towards the field of high pixels. Therefore, the requirement for high imaging quality is rapidly raised.

The traditional optical image capturing system of a portable electronic device comes with different designs, including a four-lens or a fifth-lens design. However, the requirement for the higher pixels and the requirement for a large aperture of an end user, like functionalities of micro filming and night view have been raised. The optical image capturing system in prior arts cannot meet the requirement of the higher order camera lens module.

Therefore, how to effectively increase quantity of incoming light of the optical lenses, and further improves imaging quality for the image formation, becomes a quite important issue.

SUMMARY OF THE INVENTION

The aspect of embodiment of the present disclosure directs to an optical image capturing system and an optical image capturing lens which use combination of refractive powers, convex and concave surfaces of six-piece optical lenses (the convex or concave surface in the disclosure denotes the change of geometrical shape of an object-side surface or an image-side surface of each lens with different height from an optical axis) to increase the quantity of incoming light of the optical image capturing system, and to improve imaging quality for image formation, so as to be applied to minimized electronic products.

The term and its definition to the lens element parameter in the embodiment of the present invention are shown as below for further reference.

The Lens Element Parameter Related to a Length or a Height in the Lens Element

A maximum height for image formation of the optical image capturing system is denoted by HOI. A height of the optical image capturing system is denoted by HOS. A distance from the object-side surface of the first lens element to the image-side surface of the sixth lens element is denoted by InTL. A distance from an aperture stop (aperture) to an image plane is denoted by InS. A distance from the first lens element to the second lens element is denoted by In12 (instance). A central thickness of the first lens element of the optical image capturing system on the optical axis is denoted by TP1 (instance).

The Lens Element Parameter Related to a Material in the Lens Element

An Abbe number of the first lens element in the optical image capturing system is denoted by NA1 (instance). A refractive index of the first lens element is denoted by Nd1 (instance).

The Lens Element Parameter Related to a View Angle in the Lens Element

A view angle is denoted by AF. Half of the view angle is denoted by HAF. A major light angle is denoted by MRA.

The Lens Element Parameter Related to Exit/Entrance Pupil in the Lens Element

An entrance pupil diameter of the optical image capturing system is denoted by HEP. An entrance pupil diameter of the optical image capturing system is denoted by HEP. A maximum effective half diameter position of any surface of single lens element means the vertical height between the effective half diameter (EHD) and the optical axis where the incident light of the maximum view angle of the system passes through the farthest edge of the entrance pupil on the EHD of the surface of the lens element. For example, the maximum effective half diameter position of the object-side surface of the first lens element is denoted as EHD11. The maximum effective half diameter position of the image-side of the first lens element is denoted as EHD12. The maximum effective half diameter position of the object-side surface of the second lens element is denoted as EHD21. The maximum half effective half diameter position of the image-side surface of the second lens element is denoted as EHD22. The maximum effective half diameter position of any surfaces of the remaining lens elements of the optical image capturing system can be referred as mentioned above.

The Lens Element Parameter Related to an Arc Length of the Lens Element Shape and an Outline of Surface

A length of outline curve of the maximum effective half diameter position of any surface of a single lens element refers to a length of outline curve from an axial point on the surface of the lens element to the maximum effective half diameter position of the surface along an outline of the surface of the lens element and is denoted as ARS. For example, the length of outline curve of the maximum effective half diameter position of the object-side surface of the first lens element is denoted as ARS11. The length of outline curve of the maximum effective half diameter position of the image-side surface of the first lens element is denoted as ARS12. The length of outline curve of the maximum effective half diameter position of the object-side surface of the second lens element is denoted as ARS21. The length of outline curve of the maximum effective half diameter position of the image-side surface of the second lens element is denoted as ARS22. The lengths of outline curve of the maximum effective half diameter position of any surface of the other lens elements in the optical image capturing system are denoted in the similar way.

A length of outline curve of a half of an entrance pupil diameter (HEP) of any surface of a signal lens element refers to a length of outline curve of the half of the entrance pupil diameter (HEP) from an axial point on the surface of the lens element to a coordinate point of vertical height with a distance of the half of the entrance pupil diameter from the optical axis on the surface along the outline of the surface of the lens element and is denoted as ARE. For example, the length of the outline curve of the half of the entrance pupil diameter (HEP) of the object-side surface of the first lens element is denoted as ARE11. The length of the outline curve of the half of the entrance pupil diameter (HEP) of the image-side surface of the first lens element is denoted as ARE12. The length of the outline curve of the half of the entrance pupil diameter (HEP) of the object-side surface of the second lens element is denoted as ARE21. The length of the outline curve of the half of the entrance pupil diameter (HEP) of the image-side surface of the second lens element is denoted as ARE22. The lengths of outline curves of the half of the entrance pupil diameters (HEP) of any surface of the other lens elements in the optical image capturing system are denoted in the similar way.

The Lens Element Parameter Related to a Depth of the Lens Element Shape

A horizontal distance in parallel with an optical axis from a maximum effective half diameter position to an axial point on the object-side surface of the sixth lens element is denoted by InRS61 (a depth of the maximum effective half diameter). A horizontal distance in parallel with an optical axis from a maximum effective half diameter position to an axial point on the image-side surface of the sixth lens element is denoted by InRS62 (the depth of the maximum effective half diameter). The depths of the maximum effective half diameters (sinkage values) of object surfaces and image surfaces of other lens elements are denoted in the similar way.

The Lens Element Parameter Related to the Lens Element Shape

A critical point C is a tangent point on a surface of a specific lens element, and the tangent point is tangent to a plane perpendicular to the optical axis and the tangent point cannot be a crossover point on the optical axis. To follow the past, a distance perpendicular to the optical axis between a critical point C51 on the object-side surface of the fifth lens element and the optical axis is HVT51 (instance). A distance perpendicular to the optical axis between a critical point C52 on the image-side surface of the fifth lens element and the optical axis is HVT52 (instance). A distance perpendicular to the optical axis between a critical point C61 on the object-side surface of the sixth lens element and the optical axis is HVT61 (instance). A distance perpendicular to the optical axis between a critical point C62 on the image-side surface of the sixth lens element and the optical axis is HVT62 (instance). Distances perpendicular to the optical axis between critical points on the object-side surfaces or the image-side surfaces of other lens elements and the optical axis are denoted in the similar way described above.

The object-side surface of the sixth lens element has one inflection point IF611 which is nearest to the optical axis, and the sinkage value of the inflection point IF611 is denoted by SGI611. SGI611 is a horizontal shift distance in parallel with the optical axis from an axial point on the object-side surface of the sixth lens element to the inflection point which is nearest to the optical axis on the object-side surface of the sixth lens element. A distance perpendicular to the optical axis between the inflection point IF611 and the optical axis is HIF611 (instance). The image-side surface of the sixth lens element has one inflection point IF621 which is nearest to the optical axis and the sinkage value of the inflection point IF621 is denoted by SGI621 (instance). SGI621 is a horizontal shift distance in parallel with the optical axis from an axial point on the image-side surface of the sixth lens element to the inflection point which is nearest to the optical axis on the image-side surface of the sixth lens element. A distance perpendicular to the optical axis between the inflection point IF621 and the optical axis is IF621 (instance).

The object-side surface of the sixth lens element has one inflection point IF612 which is the second nearest to the optical axis and the sinkage value of the inflection point IF612 is denoted by SGI612 (instance). SGI612 is a horizontal shift distance in parallel with the optical axis from an axial point an the object-side surface of the sixth lens element to the inflection point which is the second nearest to the optical axis on the object-side surface of the sixth lens element. A distance perpendicular to the optical axis between the inflection point IF612 and the optical axis is HIF612 (instance). The image-side surface of the sixth lens element has one inflection point IF622 which is the second nearest to the optical axis and the sinkage value of the inflection point IF622 is denoted by SGI622 (instance). SGI622 is a horizontal shift distance in parallel with the optical axis from an axial point on the image-side surface of the sixth lens element to the inflection point which is the second nearest to the optical axis on the image-side surface of the sixth lens element. A distance perpendicular to the optical axis between the inflection point IF622 and the optical axis is HIF622 (instance).

The object-side surface of the sixth lens element has one inflection point IF613 which is the third nearest to the optical axis and the sinkage value of the inflection point IF613 is denoted by SGI613 (instance). SGI613 is a horizontal shift distance in parallel with the optical axis from an axial point on the object-side surface of the sixth lens element to the inflection point which is the third nearest to the optical axis on the object-side surface of the sixth lens element. A distance perpendicular to the optical axis between the inflection point IF613 and the optical axis is HIF613 (instance). The image-side surface of the sixth lens element has one inflection point IF623 which is the third nearest to the optical axis and the sinkage value of the inflection point IF623 is denoted by SGI623 (instance). SGI623 is a horizontal shift distance in parallel with the optical axis from an axial point on the image-side surface of the sixth lens element to the inflection point which is the third nearest to the optical axis an the image-side surface of the sixth lens element. A distance perpendicular to the optical axis between the inflection point IF623 and the optical axis is HIF623 (instance).

The object-side surface of the sixth lens element has one inflection point IF614 which is the fourth nearest to the optical axis and the sinkage value of the inflection point IF614 is denoted by SGI614 (instance). SGI614 is a horizontal shift distance in parallel with the optical axis from an axial point on the object-side surface of the sixth lens element to the inflection point which is the fourth nearest to the optical axis on the object-side surface of the sixth lens element. A distance perpendicular to the optical axis between the inflection point IF614 and the optical axis is HIF614 (instance). The image-side surface of the sixth lens element has one inflection point IF624 which is the fourth nearest to the optical axis and the sinkage value of the inflection point IF624 is denoted by SGI624 (instance). SGI624 is a horizontal shift distance in parallel with the optical axis from an axial point on the image-side surface of the sixth lens element to the inflection point which is the fourth nearest to the optical axis on the image-side surface of the sixth lens element. A distance perpendicular to the optical axis between the inflection point IF624 and the optical axis is HIF624 (instance).

The inflection points on the object-side surfaces or the image-side surfaces of the other lens elements and the distances perpendicular to the optical axis thereof or the sinkage values thereof are denoted in the similar way described above.

The Lens Element Parameter Related to an Aberration

Optical distortion for image formation in the optical image capturing system is denoted by ODT. TV distortion for image formation in the optical image capturing system is denoted by TDT. Further, the range of the aberration offset for the view of image formation may be limited to 50%-100%. An offset of the spherical aberration is denoted by DFS. An offset of the coma aberration is denoted by DFC.

The lateral aberration of the stop is denoted as STA to assess the function of the specific optical image capturing system. The tangential fan or sagittal fan may be applied to calculate the STA of any view fields, and in particular, to calculate the STA of the max reference wavelength (e.g. 650 nm) and the minima reference wavelength (e.g. 470 nm) for serve as the standard of the optimal function. The aforementioned direction of the tangential fan can be further defined as the positive (overhead-light) and negative (lower-light) directions. The max operation wavelength, which passes through the STA, is defined as the image position of the specific view field, and the distance difference of two positions of image position of the view field between the max operation wavelength and the reference primary wavelength (e.g. wavelength of 555 nm), and the minimum operation wavelength, which passes through the STA, is defined as the image position of the specific view field, and STA of the max operation wavelength is defined as the distance between the image position of the specific view field of max operation wavelength and the image position of the specific view field of the reference primary wavelength (e.g. wavelength of 555 nm), and STA of the minimum operation wavelength is defined as the distance between the image position of the specific view field of the minimum operation wavelength and the image position of the specific view field of the reference primary wavelength (e.g. wavelength of 555 nm) are assessed the function of the specific optical image capturing system to be optimal. Both STA of the max operation wavelength and STA of the minimum operation wavelength on the image position of vertical height with a distance from the optical axis to 70% HOI (i.e. 0.7 HOI), which are smaller than 100 μm, are served as the sample. The numerical, which are smaller than 80 μm, are also served as the sample.

A maximum height for image formation on the image plane perpendicular to the optical axis in the optical image capturing system is denoted by HOI. A lateral aberration of the longest operation wavelength of a visible light of a positive direction tangential fan of the optical image capturing system passing through an edge of the entrance pupil and incident on the image plane by 0.7 HOI is denoted as PLTA. A lateral aberration of the shortest operation wavelength of a visible light of the positive direction tangential fan of the optical image capturing system passing through the edge of the entrance pupil and incident on the image plane by 0.7 HOI is denoted as PSTA. A lateral aberration of the longest operation wavelength of a visible light of a negative direction tangential fan of the optical image capturing system passing through the edge of the entrance pupil and incident on the image plane by 0.7 HOI is denoted as NLTA. A lateral aberration of the shortest operation wavelength of a visible light of a negative direction tangential fan of the optical image capturing system passing through the edge of the entrance pupil and incident on the image plane by 0.7 HOI is denoted as NSTA. A lateral aberration of the longest operation wavelength of a visible light of a sagittal fan of the optical image capturing system passing through the edge of the entrance pupil and incident on the image plane by 0.7 HOI is denoted as SLTA. A lateral aberration of the shortest operation wavelength of a visible light of the sagittal fan of the optical image capturing system passing through the edge of the entrance pupil and incident on the image plane by 0.7 HOI is denoted as SSTA.

The disclosure provides an optical image capturing system, an object-side surface or an image-side surface of the sixth lens element may have inflection points, such that the angle of incidence from each view field to the sixth lens element can be adjusted effectively and the optical distortion and the TV distortion can be corrected as well. Besides, the surfaces of the sixth lens element may have a better optical path adjusting ability to acquire better imaging quality.

The disclosure provides an optical image capturing system, in order from an object side to an image side, including a first, second, third, fourth, fifth, sixth lens elements and an image plane. The first lens element has refractive power. An object-side surface and an image-side surface of the sixth lens element are aspheric. Focal lengths of the first through sixth lens elements are f1, f2, f3, f4, f5 and f6 respectively. A focal length of the optical images capturing system is f. An entrance pupil diameter of the optical image capturing system is HEP. A distance on an optical axis from an object-side surface of the first lens element to the image plane is HOS. A distance on the optical axis from the object-side surface of the first lens element to the image-side surface of the sixth lens element is InTL. A length of outline curve from an axial point on any surface of any one of the six lens elements to a coordinate point of vertical height with a distance of a half of the entrance pupil diameter from the optical axis on the surface along an outline of the surface is denoted as ARE. The following relations are satisfied: $1.2 \leq f/HEP \leq 10.0$, $0 < InTL/HOS < 0.9$, and $0.9 \leq 2(ARE/HEP) \leq 1.5$.

The disclosure provides another optical image capturing system, in order from an object side to an image side, including a first, second, third, fourth, fifth, six lens elements and an image plane. The first lens element has negative refractive power and may have a convex object-side surface near the optical axis. The second lens element has refractive power. The third lens element has refractive power. The fourth lens element has refractive power. The fifth lens element has refractive power. The sixth lens element has refractive power and an object-side surface and an image-side surface of the sixth lens element are aspheric. A maximum height for image formation on the image plane perpendicular to the optical axis in the optical image capturing system is denoted by HOI, and at least one lens element among the first through sixth lens elements is made of glass material, and at least one of the second through sixth lens elements has positive refractive power. Focal lengths of the first through sixth lens elements are f1, f2, f3, f4, f5 and f6 respectively. A focal length of the optical image capturing system is f. An entrance pupil diameter of the optical image capturing system is HEP. A distance on an optical axis from an object-side surface of the first lens element to the image plane is HOS. A distance on the optical axis from the object-side surface of the first lens element to the image-side surface of the sixth lens element is InTL. A length of outline curve from an axial point on any surface of any one of the six lens elements to a coordinate point of vertical height with a distance of a half of the entrance pupil diameter from the optical axis on the surface along an outline of the surface is denoted as ARE. The following relations are satisfied: $1.2 \leq f/HEP \leq 10.0$, $0 < InTL/HOS < 0.9$, and $0.9 \leq 2(ARE/HEP) \leq 1.5$.

The disclosure provides another optical image capturing system, in order from an object side to an image side, including a first, second, third, fourth, fifth, sixth lens elements and an image plane. Wherein, the optical image capturing system consists of the six lens elements with refractive power. A maximum height for image formation on the image plane perpendicular to the optical axis in the optical image capturing system is denoted by HOI, at least two lens elements among the first through the sixth lens elements are made of glass material, and an object-side surface and an image-side surface of at least one lens element of the six lens elements are aspheric, and at least one lens element among the first through sixth lens elements respectively has at least one inflection point on at least one surface thereof. The first lens element has negative refractive power. The second lens element has refractive power. The third lens element has refractive power. The fourth lens element has refractive power. The fifth lens element has positive refractive power. The sixth lens element has refractive power. Focal lengths of the first through sixth lens elements are f1, f2, f3, f4, f5 and f6 respectively. A focal length of the optical image capturing system is f. An entrance pupil diameter of the optical image capturing system is HEP. A distance on an optical axis from an object-side surface of the first lens element to the image plane is HOS. A distance on the optical axis from the object-side surface of the first lens element to the image-side surface of the sixth lens element is InTL. A length of outline curve from an axial point on any surface of any one of the six lens elements to a coordinate point of vertical height with a distance of a half of the entrance pupil diameter from the optical axis on the surface along an outline of the surface is denoted as ARE. The following relations are satisfied: $1.2 \leq f/HEP \leq 3.5$, $0 < InTL/HOS < 0.9$, and $0.9 \leq 2(ARE/HEP) \leq 1.5$.

The length of the outline curve of any surface of a signal lens element in the maximum effective half diameter position affects the functions of the surface aberration correction and the optical path difference in each view field. The longer outline curve may lead to a better function of aberration correction, but the difficulty of the production may become inevitable. Hence, the length of the outline curve of the maximum effective half diameter position of any surface of a signal lens element (ARS) has to be controlled, and especially, the ratio relations (ARS/TP) between the length of the outline curve of the maximum effective half diameter position of the surface (ARS) and the thickness of the lens element to which the surface belongs on the optical axis (TP) has to be controlled. For example, the length of the outline curve of the maximum effective half diameter position of the object-side surface of the first lens element is denoted as ARS11, and the thickness of the first lens element on the optical axis is TP1, and the ratio between both of them is ARS11/TP1. The length of the outline curve of the maximum effective half diameter position of the image-side surface of the first lens element is denoted as ARS12, and the ratio between ARS12 and TP1 is ARS12/TP1. The length of the outline curve of the maximum effective half diameter position of the object-side surface of the second lens element is denoted as ARS21, and the thickness of the second lens element on the optical axis is TP2, and the ratio between both of them is ARS21/TP2. The length of the outline curve of the maximum effective half diameter position of the image-side surface of the second lens element is denoted as ARS22, and the ratio between ARS22 and TP2 is ARS22/TP2. The ratio relations between the lengths of the outline curve of the maximum effective half diameter position of any surface of the other lens elements and the thicknesses of the lens elements to which the surfaces belong on the optical axis (TP) are denoted in the similar way.

The length of outline curve of half of an entrance pupil diameter of any surface of a single lens element especially affects the functions of the surface aberration correction and the optical path difference in each shared view field. The longer outline curve may lead to a better function of aberration correction, but the difficulty of the production may become inevitable. Hence, the length of outline curve of half of an entrance pupil diameter of any surface of a single lens element has to be controlled, and especially, the ratio relationship between the length of outline curve of half of an entrance pupil diameter of any surface of a single lens element and the thickness on the optical axis has to be controlled. For example, the length of outline curve of the half of the entrance pupil diameter of the object-side surface of the first lens element is denoted as ARE11, and the thickness of the first lens element on the optical axis is TP1, and the ratio thereof is ARE11/TP1. The length of outline curve of the half of the entrance pupil diameter of the image-side surface of the first lens element is denoted as ARE12, and the thickness of the first lens element on the optical axis is TP1, and the ratio thereof is ARE12/TP1. The length of outline curve of the half of the entrance pupil diameter of the object-side surface of the first lens element is denoted as ARE21, and the thickness of the second lens element on the optical axis is TP2, and the ratio thereof is ARE21/TP2. The length of outline curve of the half of the entrance pupil diameter of the image-side surface of the second lens element is denoted as ARE22, and the thickness of the second lens element on the optical axis is TP2, and the ratio thereof is ARE22/TP2. The ratio relationship of the remaining lens elements of the optical image capturing system can be referred as mentioned above.

The height of optical system (HOS) may be reduced to achieve the minimization of the optical image capturing system when the absolute value of f1 is larger than f6 ($|f1|>f6$).

When $|f2|+|f3|+|f4|+|f5|$ and $|f1|+|f6|$ are satisfied with above relations, at least one of the second through fifth lens elements may have weak positive refractive power or weak negative refractive power. The weak refractive power indicates that an absolute value of the focal length of a specific lens element is greater than 10. When at least one of the second through fifth lens elements has the weak positive refractive power, the positive refractive power of the first lens element can be shared, such that the unnecessary aberration will not appear too early. On the contrary, when at least one of the second through fifth lens elements has the weak negative refractive power, the aberration of the optical image capturing system can be corrected and fine tuned.

The sixth lens element may have negative refractive power and a concave image-side surface. Hereby, the back focal length is reduced for keeping the miniaturization, to miniaturize the lens element effectively. In addition, at least one of the object-side surface and the image-side surface of the sixth lens element may have at least one inflection point, such that the angle of incident with incoming light from an off-axis view field can be suppressed effectively and the aberration in the off-axis view field can be corrected further.

BRIEF DESCRIPTION OF THE DRAWINGS

The detailed structure, operating principle and effects of the present disclosure will now be described in more details hereinafter with reference to the accompanying drawings that show various embodiments of the present disclosure as follows.

FIG. **1**A is a schematic view of the optical image capturing system according to the first embodiment of the present application.

FIG. **1**B is longitudinal spherical aberration curves, astigmatic field curves, and an optical distortion grid of the optical image capturing system in the order from left to right according to the first embodiment of the present application.

FIG. **1**C is a lateral aberration diagram of tangential fan, sagittal fan, the longest operation wavelength and the shortest operation wavelength passing through an edge of the entrance pupil and incident on the image plane by 0.7 HOI according to the first embodiment of the present application.

FIG. **2**A is a schematic view of the optical image capturing system according to the second embodiment of the present application.

FIG. **2**B is longitudinal spherical aberration curves, astigmatic field curves, and an optical distortion grid of the optical image capturing system in the order from left to right according to the second embodiment of the present application.

FIG. **2**C is a lateral aberration diagram of tangential fan, sagittal fan, the longest operation wavelength and the shortest operation wavelength passing through an edge of the entrance pupil and incident on the image plane by 0.7 HOI according to the second embodiment of the present application.

FIG. **3**A is a schematic view of the optical image capturing system according to the third embodiment of the present application.

FIG. **3**B is longitudinal spherical aberration curves, astigmatic field curves, and an optical distortion grid of the optical image capturing system in the order from left to right according to the third embodiment of the present application.

FIG. **3**C is a lateral aberration diagram of tangential fan, sagittal fan, the longest operation wavelength and the shortest operation wavelength passing through an edge of the entrance pupil and incident on the image plane by 0.7 HOI according to the third embodiment of the present application.

FIG. **4**A is a schematic view of the optical image capturing system according to the fourth embodiment of the present application.

FIG. **4**B is longitudinal spherical aberration curves, astigmatic field curves, and an optical distortion grid of the optical image capturing system in the order from left to right according to the fourth embodiment of the present application.

FIG. **4**C is a lateral aberration diagram of tangential fan, sagittal fan, the longest operation wavelength and the shortest operation wavelength passing through an edge of the entrance pupil and incident on the image plane by 0.7 HOI according to the fourth embodiment of the present application.

FIG. **5**A is a schematic view of the optical image capturing system according to the fifth embodiment of the present application.

FIG. **5**B is longitudinal spherical aberration curves, astigmatic field curves, and an optical distortion grid of the optical image capturing system in the order from left to right according to the fifth embodiment of the present application.

FIG. **5**C is a lateral aberration diagram of tangential fan, sagittal fan, the longest operation wavelength and the shortest operation wavelength passing through an edge of the entrance pupil and incident on the image plane by 0.7 HOI according to the fifth embodiment of the present application.

FIG. **6**A is a schematic view of the optical image capturing system according to the sixth embodiment of the present application.

FIG. **6**B is longitudinal spherical aberration curves, astigmatic field curves, and an optical distortion grid of the optical image capturing system in the order from left to right according to the sixth embodiment of the present application.

FIG. **6**C is a lateral aberration diagram of tangential fan, sagittal fan, the longest operation wavelength and the shortest operation wavelength passing through an edge of the entrance pupil and incident on the image plane by 0.7 HOI according to the sixth embodiment of the present application.

FIG. **7**A is a schematic view of the optical image capturing system according to the seventh embodiment of the present application.

FIG. **7**B is longitudinal spherical aberration curves, astigmatic field curves, and an optical distortion grid of the optical image capturing system in the order from left to right according to the seventh embodiment of the present application.

FIG. **7**C is a lateral aberration diagram of tangential fan, sagittal fan, the longest operation wavelength and the shortest operation wavelength passing through an edge of the entrance pupil and incident on the image plane by 0.7 HOI according to the seventh embodiment of the present application.

FIG. **8**A is a schematic view of the optical image capturing system according to the eighth embodiment of the present application.

FIG. **8**B is longitudinal spherical aberration curves, astigmatic field curves, and an optical distortion grid of the optical image capturing system in the order from left to right according to the eighth embodiment of the present application.

FIG. **8**C is a lateral aberration diagram of tangential fan, sagittal fan, the longest operation wavelength and the shortest operation wavelength passing through an edge of the entrance pupil and incident on the image plane by 0.7 HOI according to the eighth embodiment of the present application.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Reference will now be made in detail to the exemplary embodiments of the present disclosure, examples of which are illustrated in the accompanying drawings. Therefore, it is to be understood that the foregoing is illustrative of exemplary embodiments and is not to be construed as limited to the specific embodiments disclosed, and that modifications to the disclosed exemplary embodiments, as well as other exemplary embodiments, are intended to be included within the scope of the appended claims. These embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the inventive concept to those skilled in the art. The relative proportions and ratios of elements in the drawings may be exaggerated or diminished in size for the sake of clarity and convenience in the drawings, and such arbitrary proportions are only illustrative and not limiting in any way. The same reference numbers are used in the drawings and the description to refer to the same or like parts.

It will be understood that, although the terms 'first', 'second', 'third', etc., may be used herein to describe various elements, these elements should not be limited by these terms. The terms are used only for the purpose of distinguishing one component from another component. Thus, a first element discussed below could be termed a second element without departing from the teachings of embodiments. As used herein, the term "or" includes any and all combinations of one or more of the associated listed items.

An optical image capturing system, in order from an object side to an image side, includes a first, second, third, fourth, fifth and sixth lens elements with refractive power and an image plane. The optical image capturing system may further include an image sensing device which is disposed on an image plane.

The optical image capturing system may use three sets of wavelengths which are 486.1 nm, 587.5 nm and 656.2 nm, respectively, wherein 587.5 nm is served as the primary reference wavelength and a reference wavelength for retrieving technical features. The optical image capturing system may also use five sets of wavelengths which are 470 nm, 510 nm, 555 nm, 610 nm and 650 nm, respectively, wherein 555 nm is served as the primary reference wavelength and a reference wavelength for retrieving technical features.

A ratio of the focal length f of the optical image capturing system to a focal length fp of each of lens elements with positive refractive power is PPR. A ratio of the focal length f of the optical image capturing system to a focal length fn of each of lens elements with negative refractive power is NPR. A sum of the PPR of all lens elements with positive refractive power is ΣPPR. A sum of the NPR of all lens elements with negative refractive powers is ΣNPR. It is beneficial to control the total refractive power and the total length of the optical image capturing system when following conditions are satisfied: $0.5 \leq \Sigma PPR/|\Sigma NPR| \leq 15$. Preferably, the following relation may be satisfied: $1 \leq \Sigma PPR/|\Sigma NPR| \leq 3.0$.

The optical image capturing system may further include an image sensing device which is disposed on an image plane. Half of a diagonal of an effective detection field of the image sensing device (imaging height or the maximum image height of the optical image capturing system) is HOI. A distance on the optical axis from the object-side surface of the first lens element to the image plane is HOS. The following relations are satisfied: $HOS/HOI \leq 50$ and $0.5 \leq HOS/f \leq 150$. Preferably, the following relations may be satisfied: $1 \leq HOS/HOI \leq 40$ and $1 \leq HOS/f \leq 140$. Hereby, the miniaturization of the optical image capturing system can be maintained effectively, so as to be carried by lightweight portable electronic devices.

In addition, in the optical image capturing system of the disclosure, according to different requirements, at least one aperture stop may be arranged for reducing stray light and improving the imaging quality.

In the optical image capturing system of the disclosure, the aperture stop may be a front or middle aperture. The front aperture is the aperture stop between a photographed object and the first lens element. The middle aperture is the aperture stop between the first lens element and the image plane. If the aperture stop is the front aperture, a longer distance between the exit pupil and the image plane of the optical image capturing system can be formed, such that more optical elements can be disposed in the optical image capturing system and the efficiency of receiving images of the image sensing device can be raised. If the aperture stop is the middle aperture, the view angle of the optical image capturing system can be expended, such that the optical image capturing system has the same advantage that is owned by wide angle cameras. A distance from the aperture stop to the image plane is InS. The following relation is satisfied: $0.1 \leq InS/HOS \leq 1.1$. Hereby, the miniaturization of the optical image capturing system can be maintained while the feature of the wild-angle lens element can be achieved.

In the optical image capturing system of the disclosure, a distance from the object-side surface of the first lens element to the image-side surface of the sixth lens element is InTL. A total central thickness of all lens elements with refractive power on the optical axis is ΣTP. The following relation is satisfied: $0.1 \leq \Sigma TP/InTL \leq 0.9$. Hereby, contrast ratio for the image formation in the optical image capturing system and defect-free rate for manufacturing the lens element can be given consideration simultaneously, and a proper back focal length is provided to dispose other optical components in the optical image capturing system.

A curvature radius of the object-side surface of the first lens element is R1. A curvature radius of the image-side surface of the first lens element is R2. The following relation is satisfied: $0.001 \leq |R1/R2| \leq 25$. Hereby, the first lens element may have proper strength of the positive refractive power, so as to avoid the longitudinal spherical aberration to increase too fast. Preferably, the following relation may be satisfied: $0.01 \leq |R1/R2| < 12$.

A curvature radius of the object-side surface of the sixth lens element is R11. A curvature radius of the image-side surface of the sixth lens element is R12. The following relation is satisfied: $-7 < (R11-R12)/(R11+R12) < 50$. Hereby, the astigmatism generated by the optical image capturing system can be corrected beneficially.

A distance between the first lens element and the second lens element on the optical axis is IN12. The following relation is satisfied: $IN12/f \leq 60$. Hereby, the chromatic aberration of the lens elements can be improved, such that the performance can be increased.

A distance between the fifth lens element and the sixth lens element on the optical axis is IN56. The following relation is satisfied: $IN56/f \leq 3.0$. Hereby, the function of the lens elements can be improved.

Central thicknesses of the first lens element and the second lens element on the optical axis are TP1 and TP2, respectively. The following relation is satisfied: $0.1 \leq (TP1+IN12)/TP2 \leq 10$. Hereby, the sensitivity produced by the optical image capturing system can be controlled, and the performance can be increased.

Central thicknesses of the fifth lens element and the sixth lens element on the optical axis are TP5 and TP6, respectively, and a distance between the aforementioned two lens elements on the optical axis is IN56. The following relation is satisfied: $0.1 \leq (TP6+IN56)/TP5 \leq 15$. Hereby, the sensitivity produced by the optical image capturing system can be controlled and the total height of the optical image capturing system can be reduced.

Central thicknesses of the second lens element, the third lens element and the fourth lens element on the optical axis are TP2, TP3 and TP4, respectively. A distance between the second and the third lens elements on the optical axis is IN23, and a distance between the third and the fourth lens elements on the optical axis is IN45. A distance between an object-side surface of the first lens element and an image-side surface of sixth lens element is InTL. The following relation is satisfied: $0.1 \leq TP4/(IN34+TP4+IN45) < 1$. Hereby, the aberration generated by the process of moving the incident light can be adjusted slightly layer upon layer, and the total height of the optical image capturing system can be reduced.

In the optical image capturing system of the first embodiment, a distance perpendicular to the optical axis between a critical point C61 on an object-side surface of the sixth lens element and the optical axis is HVT61. A distance perpendicular to the optical axis between a critical point C62 on an image-side surface of the sixth lens element and the optical axis is HVT62. A distance in parallel with the optical axis from an axial point on the object-side surface of the sixth lens element to the critical point C61 is SGC61. A distance in parallel with the optical axis from an axial point on the image-side surface of the sixth lens element to the critical point C62 is SGC62. The following relations may be satisfied: 0 mm≤HVT61≤3 mm, 0 mm<HVT62≤6 mm, 0≤HVT61/HVT62, 0 mm≤|SGC61|≤0.5 mm:0 mm<|SGC62|≤2 mm, and 0<|SGC62|/(|SGC62|+TP6)≤0.9. Hereby, the aberration of the off-axis view field can be corrected effectively.

The following relation is satisfied for the optical image capturing system of the disclosure: 0.2≤HVT62/HOI≤0.9. Preferably, the following relation may be satisfied: 0.3≤HVT62/HOI≤0.8. Hereby, the aberration of surrounding view field for the optical image capturing system can be corrected beneficially.

The following relation is satisfied for the optical image capturing system of the disclosure: 0≤HVT62/HOS≤0.5. Preferably, the following relation may be satisfied: 0.2≤HVT62/HOS≤0.45. Hereby, the aberration of surrounding view field for the optical image capturing system can be corrected beneficially.

In the optical image capturing system of the disclosure, a distance in parallel with an optical axis from an inflection point on the object-side surface of the sixth lens element which is nearest to the optical axis to an axial point on the object-side surface of the sixth lens element is denoted by SGI611. A distance in parallel with an optical axis from an inflection point on the image-side surface of the sixth lens element which is nearest to the optical axis to an axial point on the image-side surface of the sixth lens element is denoted by SGI621. The following relations are satisfied: 0<SGI611/(SGI611+TP6)≤0.9 and 0<SGI621/(SGI621+TP6)≤0.9. Preferably, the following relations may be satisfied: 0.1≤SGI611/(SGI611+TP6)≤0.6 and 0.1≤SGI621/(SGI621+TP6)≤0.6.

A distance in parallel with the optical axis from the inflection point on the object-side surface of the sixth lens element which is the second nearest to the optical axis to an axial point on the object-side surface of the sixth lens element is denoted by SGI612. A distance in parallel with an optical axis from an inflection point on the image-side surface of the sixth lens element which is the second nearest to the optical axis to an axial point on the image-side surface of the sixth lens element is denoted by SGI622. The following relations are satisfied: 0<SGI612/(SGI612+TP6)≤0.9 and 0<SGI622/(SGI622+TP6)≤0.9. Preferably, the following relations may be satisfied: 0.1≤SGI612/(SGI612+TP6)≤0.6 and 0.1≤SGI622/(SGI622+TP6)≤0.6.

A distance perpendicular to the optical axis between the inflection point on the object-side surface of the sixth lens element which is the nearest to the optical axis and the optical axis is denoted by HIF611. A distance perpendicular to the optical axis between an axial point on the image-side surface of the sixth lens element and an inflection point on the image-side surface of the sixth lens element which is the nearest to the optical axis is denoted by HIF621. The following relations are satisfied: 0.001 mm≤|HIF611|≤5 mm and 0.001 mm≤|HIF621|≤5 mm. Preferably, the following relations may be satisfied: 0.1 mm≤|HIF611|≤3.5 mm and 1.5 mm≤|HIF621|≤3.5 mm.

A distance perpendicular to the optical axis between the inflection point on the object-side surface of the sixth lens element which is the second nearest to the optical axis and the optical axis is denoted by HIF612. A distance perpendicular to the optical axis between an axial point on the image-side surface of the sixth lens element and an inflection point on the image-side surface of the sixth lens element which is the second nearest to the optical axis is denoted by HIF622. The following relations are satisfied: 0.001 mm≤|HIF612|≤5 mm and 0.001 mm≤|HIF622|≤5 mm. Preferably, the following relations may be satisfied: 0.1 mm≤|HIF622|≤3.5 mm and 0.1 mm≤|HIF612|≤3.5 mm.

A distance perpendicular to the optical axis between the inflection point on the object-side surface of the sixth lens element which is the third nearest to the optical axis and the optical axis is denoted by HIF613. A distance perpendicular to the optical axis between an axial point on the image-side surface of the sixth lens element and an inflection point on the image-side surface of the sixth lens element which is the third nearest to the optical axis is denoted by HIF623. The following relations are satisfied: 0.001 mm≤|HIF613|≤5 mm and 0.001 mm≤|HIF623|≤5 mm. Preferably, the following relations may be satisfied: 0.1 mm≤|HIF623|≤3.5 mm and 0.1 mm≤|HIF613|≤3.5 mm.

A distance perpendicular to the optical axis between the inflection point on the object-side surface of the sixth lens element which is the fourth nearest to the optical axis and the optical axis is denoted by HIF614. A distance perpendicular to the optical axis between an axial point on the image-side surface of the sixth lens element and an inflection point on the image-side surface of the sixth lens element which is the fourth nearest to the optical axis is denoted by HIF624. The following relations are satisfied: 0.001 mm≤|HIF614|≤5 mm and 0.001 mm≤|HIF624|≤5 mm. Preferably, the following relations may be satisfied: 0.1 mm≤|HIF624|≤3.5 mm and 0.1 mm≤|HIF614|≤3.5 mm.

In one embodiment of the optical image capturing system of the present disclosure, the chromatic aberration of the optical image capturing system can be corrected by alternatively arranging the lens elements with large Abbe number and small Abbe number.

The above Aspheric formula is:

$$z=ch^2/[1+[1-(k+1)c^2h^2]^{0.5}]+A4h^4+A6h^6+A8h^8+A10h^{10}+A12h^{12}+A14h^{14}+A16h^{16}+A18h^{18}+A20h^{20}+ \quad (1),$$

where z is a position value of the position along the optical axis and at the height h which reference to the surface apex; k is the conic coefficient, c is the reciprocal of curvature radius, and A4, A6, A8, A10, A12, A14, A16, A18, and A20 are high order aspheric coefficients.

The optical image capturing system provided by the disclosure, the lens elements may be made of glass or plastic material. If plastic material is adopted to produce the lens elements, the cost of manufacturing will be lowered effectively. If lens elements are made of glass, the heat effect can be controlled and the designed space arranged for the refractive power of the optical image capturing system can be increased. Besides, the object-side surface and the image-side surface of the first through sixth lens elements may be aspheric, so as to obtain more control variables. Comparing with the usage of traditional lens element made by glass, the number of lens elements used can be reduced and the aberration can be eliminated. Thus, the total height of the optical image capturing system can be reduced effectively.

In addition, in the optical image capturing system provided by the disclosure, if the lens element has a convex surface, the surface of the lens element adjacent to the optical axis is convex in principle. If the lens element has a concave surface, the surface of the lens element adjacent to the optical axis is concave in principle.

The optical image capturing system of the disclosure can be adapted to the optical image capturing system with automatic focus if required. With the features of a good aberration correction and a high quality of image formation, the optical image capturing system can be used in various application fields.

The optical image capturing system of the disclosure can include a driving module according to the actual requirements. The driving module may be coupled with the lens elements to enable the lens elements producing displacement. The driving module may be the voice coil motor (VCM) which is applied to move the lens to focus, or may be the optical image stabilization (OIS) which is applied to reduce the distortion frequency owing to the vibration of the lens while shooting.

At least one of the first, second, third, fourth, fifth and sixth lens elements of the optical image capturing system of the disclosure may further be designed as a light filtration element with a wavelength of less than 500 nm according to the actual requirement. The light filter element may be made by coating at least one surface of the specific lens element characterized of the filter function, and alternatively, may be made by the lens element per se made of the material which is capable of filtering short wavelength.

According to the above embodiments, the specific embodiments with figures are presented in detail as below.

The First Embodiment (Embodiment 1)

Please refer to FIG. **1**A and FIG. **1**B. FIG. **1**A is a schematic view of the optical image capturing system according to the first embodiment of the present application, FIG. **1**B is longitudinal spherical aberration curves, astigmatic field curves, and an optical distortion curve of the optical image capturing system in the order from left to right according to the first embodiment of the present application, and FIG. **1**C is a lateral aberration diagram of tangential fan, sagittal fan, the longest operation wavelength and the shortest operation wavelength passing through an edge of the entrance pupil and incident on the image plane by 0.7 HOI according to the first embodiment of the present application. As shown in FIG. **1**A, in order from an object side to an image side, the optical image capturing system includes a first lens element **110**, an aperture stop **100**, a second lens element **120**, a third lens element **130**, a fourth lens element **140**, a fifth lens element **150**, a sixth lens element **160**, an IR-bandstop filter **180**, an image plane **190**, and an image sensing device **192**.

The first lens element **110** has negative refractive power and it is made of plastic material. The first lens element **110** has a concave object-side surface **112** and a concave image-side surface **114**, both of the object-side surface **112** and the image-side surface **114** are aspheric, and the object-side surface **112** has two inflection points. The length of outline curve of the maximum effective half diameter position of the object-side surface of the first lens element is denoted as ARS11. The length of outline curve of the maximum effective half diameter position of the image-side surface of the first lens element is denoted as ARS12. The length of outline curve of a half of an entrance pupil diameter (HEP) of the object-side surface of the first lens element is denoted as ARE11, and the length of outline curve of the half of the entrance pupil diameter (HEP) of the image-side surface of the first lens element is denoted as ARE12. The thickness of the first lens element on the optical axis is TP1.

A distance in parallel with an optical axis from an inflection point on the object-side surface of the first lens element which is nearest to the optical axis to an axial point on the object-side surface of the first lens element is denoted by SGI111. A distance in parallel with an optical axis from an inflection point on the image-side surface of the first lens element which is nearest to the optical axis to an axial point on the image-side surface of the first lens element is denoted by SGI121. The following relations are satisfied: SGI111=−0.0031 mm and |SGI111|/(|SGI111|+TP1)=0.0016.

A distance in parallel with an optical axis from an inflection point on the object-side surface of the first lens element which is the second nearest to the optical axis to an axial point on the object-side surface of the first lens element is denoted by SGI112. A distance in parallel with an optical axis from an inflection point on the image-side surface of the first lens element which is the second nearest to the optical axis to an axial point on the image-side surface of the first lens element is denoted by SGI122. The following relations are satisfied: SGI112=1.3178 mm and |SGI112|/(|SGI112|+TP1)=0.4052.

A distance perpendicular to the optical axis from the inflection point on the object-side surface of the first lens element which is nearest to the optical axis to an axial point on the object-side surface of the first lens element is denoted by HIF111. A distance perpendicular to the optical axis from the inflection point on the image-side surface of the first lens element which is nearest to the optical axis to an axial point on the image-side surface of the first lens element is denoted by HIF121. The following relations are satisfied: HIF111=0.5557 mm and HIF111/HOI=0.1111.

A distance perpendicular to the optical axis from the inflection point on the object-side surface of the first lens element which is the second nearest to the optical axis to an axial point on the object-side surface of the first lens element is denoted by HIF112. A distance perpendicular to the optical axis from the inflection point on the image-side surface of the first lens element which is the second nearest to the optical axis to an axial point on the image-side surface of the first lens element is denoted by HIF121. The following relations are satisfied: HIF112=5.3732 mm and HIF112/HOI=1.0746.

The second lens element **120** has positive refractive power and it is made of plastic material. The second lens element **120** has a convex object-side surface **122** and a convex image-side surface **124**, and both of the object-side surface **122** and the image-side surface **124** are aspheric. The object-side surface **122** has an inflection point. The length of outline curve of the maximum effective half diameter position of the object-side surface of the second lens element is denoted as ARS21, and the length of outline curve of the maximum effective half diameter position of the image-side surface of the second lens element is denoted as ARS22. The length of outline curve of a half of an entrance pupil diameter (HEP) of the object-side surface of the second lens element is denoted as ARE21, and the length of outline curve of the half of the entrance pupil diameter (HEP) of the image-side surface of the second lens element is denoted as ARE22. The thickness of the second lens element on the optical axis is TP2.

A distance in parallel with an optical axis from an inflection point on the object-side surface of the second lens element which is nearest to the optical axis to an axial point on the object-side surface of the second lens element is denoted by SGI211. A distance in parallel with an optical axis from an inflection point on the image-side surface of the second lens element which is nearest to the optical axis to an axial point on the image-side surface of the second lens element is denoted by SGI221. The following relations are satisfied: SGI211=0.1069 mm, |SGI211|/(|SGI211|+TP2)=0.0412, SGI221=0 mm and |SGI221|/(|SGI221|+TP2)=0.

A distance perpendicular to the optical axis from the inflection point on the object-side surface of the second lens element which is nearest to the optical axis to an axial point on the object-side surface of the second lens element is denoted by HIF211. A distance perpendicular to the optical axis from the inflection point on the image-side surface of the second lens element which is nearest to the optical axis to an axial point on the image-side surface of the second lens element is denoted by HIF221. The following relations are satisfied: HIF211=1.1264 mm, HIF211/HOI=0.2253, HIF221=0 mm and HIF221/HOI=0.

The third lens element **130** has negative refractive power and it is made of plastic material. The third lens element **130** has a concave object-side surface **132** and a convex image-side surface **134**, and both of the object-side surface **132** and the image-side surface **134** are aspheric. The object-side surface **132** and the image-side surface **134** both have an inflection point. The length of outline curve of the maximum effective half diameter position of the object-side surface of the third lens element is denoted as ARS31, and the length of outline curve of the maximum effective half diameter position of the image-side surface of the third lens element is denoted as ARS32. The length of outline curve of a half of an entrance pupil diameter (HEP) of the object-side surface of the third lens element is denoted as ARE31, and the length of outline curve of the half of the entrance pupil diameter (HEP) of the image-side surface of the third lens element is denoted as ARE32. The thickness of the third lens element on the optical axis is TP3.

A distance in parallel with an optical axis from an inflection point on the object-side surface of the third lens element which is nearest to the optical axis to an axial point on the object-side surface of the third lens element is denoted by SGI311. A distance in parallel with an optical axis from an inflection point on the image-side surface of the third lens element which is nearest to the optical axis to an axial point on the image-side surface of the third lens element is denoted by SGI321. The following relations are satisfied: SGI311=−0.3041 mm, |SGI311|/(|SGI311|+TP3)=0.4445, SGI321=−0.1172 mm and |SGI321|/(|SGI321|+TP3)=0.2357.

A distance perpendicular to the optical axis between the inflection point on the object-side surface of the third lens element which is nearest to the optical axis and the optical axis is denoted by HIF311. A distance perpendicular to the optical axis from the inflection point on the image-side surface of the third lens element which is nearest to the optical axis to an axial point on the image-side surface of the third lens element is denoted by HIF321. The following relations are satisfied: HIF311=1.5907 mm, HIF311/HOI=0.3181, HIF321=1.3380 mm and HIF321/HOI=0.2676.

The fourth lens element **140** has positive refractive power and it is made of plastic material. The fourth lens element **140** has a convex object-side surface **142** and a concave image-side surface **144**, both of the object-side surface **142** and the image-side surface **144** are aspheric, the object-side surface **142** has two inflection points, and the image-side surface **144** has an inflection point. The length of outline curve of the maximum effective half diameter position of the object-side surface of the fourth lens element is denoted as ARS41, and the length of outline curve of the maximum effective half diameter position of the image-side surface of the fourth lens element is denoted as ARS42. The length of outline curve of a half of an entrance pupil diameter (HEP) of the object-side surface of the fourth lens element is denoted as ARE41, and the length of outline curve of the half of the entrance pupil diameter (HEP) of the image-side surface of the fourth lens element is denoted as ARE42. The thickness of the fourth lens element on the optical axis is TP4.

A distance in parallel with an optical axis from an inflection point on the object-side surface of the fourth lens element which is nearest to the optical axis to an axial point on the object-side surface of the fourth lens element is denoted by SGI411. A distance in parallel with an optical axis from an inflection point on the image-side surface of the fourth lens element which is nearest to the optical axis to an axial point on the image-side surface of the fourth lens element is denoted by SGI421. The following relations are satisfied: SGI411=0.0070 mm, |SGI411|/(|SGI411|+TP4)=0.0095, SGI421=0.0006 mm and |SGI421|/(|SGI421|+TP4)=0.0005.

A distance in parallel with an optical axis from an inflection point on the object-side surface of the fourth lens element which is the second nearest to the optical axis to an axial point on the object-side surface of the fourth lens element is denoted by SGI412. A distance in parallel with an optical axis from an inflection point on the image-side surface of the fourth lens element which is the second nearest to the optical axis to an axial point on the image-side surface of the fourth lens element is denoted by SGI422. The following relations are satisfied: SGI412=−0.2078 mm and |SGI412|/(|SGI412+TP4)=0.1439.

A distance perpendicular to the optical axis between the inflection point on the object-side surface of the fourth lens element which is nearest to the optical axis and the optical axis is denoted by HIF411. A distance perpendicular to the optical axis between the inflection point on the image-side surface of the fourth lens element which is nearest to the optical axis and the optical axis is denoted by HIF421. The following relations are satisfied: HIF411=0.4706 mm, HIF411/HOI=0.0941, HIF421=0.1721 mm and HIF421/HOI=0.0344.

A distance perpendicular to the optical axis between the inflection point on the object side surface of the fourth lens element which is the second nearest to the optical axis and the optical axis is denoted by HIF412. A distance perpendicular to the optical axis between the inflection point on the image-side surface of the fourth lens element which is the second nearest to the optical axis and the optical axis is denoted by HIF422. The following relations are satisfied: HIF412=2.0421 mm and HIF412/HOI=0.4084.

The fifth lens element **150** has positive refractive power and it is made of plastic material. The fifth lens element **150** has a convex object-side surface **152** and a convex image-side surface **154**, and both of the object-side surface **152** and the image-side surface **154** are aspheric. The object-side surface **152** has two inflection points and the image-side surface **154** has an inflection point. The length of outline curve of the maximum effective half diameter position of the object-side surface of the fifth lens element is denoted as ARS51, and the length of outline curve of the maximum effective half diameter position of the image-side surface of the fifth lens element is denoted as ARS52. The length of outline curve of a half of an entrance pupil diameter (HEP) of the object-side surface of the fifth lens element is denoted as ARE51, and the length of outline curve of the half of the entrance pupil diameter (HEP) of the image-side surface of the fifth lens element is denoted as ARE52. The thickness of the fifth lens element on the optical axis is TP5.

A distance in parallel with an optical axis from an inflection point on the object-side surface of the fifth lens element which is nearest to the optical axis to an axial point on the object-side surface of the fifth lens element is denoted by SGI511. A distance in parallel with an optical axis from an inflection point on the image-side surface of the fifth lens element which is nearest to the optical axis to an axial point on the image-side surface of the fifth lens element is denoted by SGI521. The following relations are satisfied: SGI511=0.00364 mm, |SGI511|/(|SGI511|+TP5)=0.00338, SGI521=−0.63365 mm and |SGI521|/(|SGI521|+TP5)=0.37154.

A distance in parallel with an optical axis from an inflection point on the object-side surface of the fifth lens element which is the second nearest to the optical axis to an axial point on the object-side surface of the fifth lens element is denoted by SGI512. A distance in parallel with an optical axis from an inflection point on the image-side surface of the fifth lens element which is the second nearest to the optical axis to an axial point on the image-side surface of the fifth lens element is denoted by SGI522. The following relations are satisfied: SGI512=−0.32032 mm and |SGI512|/(|SGI512|+TP5)=0.23009.

A distance in parallel with an optical axis from an inflection point on the object-side surface of the fifth lens element which is the third nearest to the optical axis to an axial point on the object-side surface of the fifth lens element is denoted by SGI513. A distance in parallel with an optical axis from an inflection point on the image-side surface of the fifth lens element which is the third nearest to the optical axis to an axial point on the image-side surface of the fifth lens element is denoted by SGI523. The following relations are satisfied: SGI513=0 mm, |SGI513|/(|SGI513|+TP5)=0, SGI523=0 mm and |SGI523|/(|SGI523|+TP5)=0.

A distance in parallel with an optical axis from an inflection point on the object-side surface of the fifth lens element which is the fourth nearest to the optical axis to an axial point on the object-side surface of the fifth lens element is denoted by SGI514. A distance in parallel with an optical axis from an inflection point on the image-side surface of the fifth lens element which is the fourth nearest to the optical axis to an axial point on the image-side surface of the fifth lens element is denoted by SGI524. The following relations are satisfied: SGI514=0 mm, |SGI514|/(|SGI514|+TP5)=0, SGI524=0 mm and |SGI524|/(|SGI524|+TP5)=0.

A distance perpendicular to the optical axis between the inflection point on the object-side surface of the fifth lens element which is nearest to the optical axis and the optical axis is denoted by HIF511. A distance perpendicular to the optical axis between the inflection point on the image-side surface of the fifth lens element which is nearest to the optical axis and the optical axis is denoted by HIF521. The following relations are satisfied: HIF511=0.28212 mm, HIF511/HOI=0.05642, HIF521=2.13850 mm and HIF521/HOI=0.42770.

A distance perpendicular to the optical axis between the inflection point on the object-side surface of the fifth lens element which is the second nearest to the optical axis and the optical axis is denoted by HIF512. A distance perpendicular to the optical axis between the inflection point on the image-side surface of the fifth lens element which is the second nearest to the optical axis and the optical axis is denoted by HIF522. The following relations are satisfied: HIF512=2.51384 mm and HIF512/HOI=0.50277.

A distance perpendicular to the optical axis between the inflection point on the object-side surface of the fifth lens element which is the third nearest to the optical axis and the optical axis is denoted by HIF513. A distance perpendicular to the optical axis between the inflection point on the image-side surface of the fifth lens element which is the third nearest to the optical axis and the optical axis is denoted by HIF523. The following relations are satisfied: HIF513=0 mm, HIF513/HOI=3, HIF523=0 mm and HIF523/HOI=0.

A distance perpendicular to the optical axis between the inflection point on the object-side surface of the fifth lens element which is the fourth nearest to the optical axis and the optical axis is denoted by HIF514. A distance perpendicular to the optical axis between the inflection point on the image-side surface of the fifth lens element which is the fourth nearest to the optical axis and the optical axis is denoted by HIF524. The following relations are satisfied: HIF514=0 mm, HIF514/HOI=0, HIF524=0 mm and HIF524/HOI=0.

The sixth lens element **160** has negative refractive power and it is made of plastic material. The sixth lens element **160** has a concave object-side surface **162** and a concave image-side surface **164**, and the object-side surface **162** has two inflection points and the image-side surface **164** has an inflection point. Hereby, the angle of incident of each view field on the sixth lens element can be effectively adjusted and the spherical aberration can thus be improved. The length of outline curve of the maximum effective half diameter position of the object-side surface of the sixth lens element is denoted as ARS61, and the length of outline curve of the maximum effective half diameter position of the image-side surface of the sixth lens element is denoted as ARS62. The length of outline curve of a half of an entrance pupil diameter (HEP) of the object-side surface of the sixth lens element is denoted as ARE61, and the length of outline curve of the half of the entrance pupil diameter (HEP) of the image-side surface of the sixth lens element is denoted as ARE62. The thickness of the sixth lens element on the optical axis is TP6.

A distance in parallel with an optical axis from an inflection point on the object-side surface of the sixth lens element which is nearest to the optical axis to an axial point on the object-side surface of the sixth lens element is denoted by SGI611. A distance in parallel with an optical axis from an inflection point on the image-side surface of the sixth lens element which is nearest to the optical axis to an axial point on the image-side surface of the sixth lens element is denoted by SGI621. The following relations are satisfied: SGI611=−0.38558 mm, |SGI611|/(|SGI611|+TP6)=0.27212, SGI621=0.12386 mm and |SGI621|/(|SGI621|+TP6)=0.10722.

A distance in parallel with an optical axis from an inflection point on the object-side surface of the sixth lens element which is the second nearest to the optical axis to an axial point on the object-side surface of the sixth lens element is denoted by SGI612. A distance in parallel with an optical axis from an inflection point on the image-side surface of the sixth lens element which is the second nearest to the optical axis to an axial point on the image-side surface of the sixth lens element is denoted by SGI622. The following relations are satisfied: SGI612=−0.47400 mm, |SGI612|/(|SGI612|+TP6)=0.31488, SIG622=0 mm and |SGI622|/(|SGI622|+TP6)=0.

A distance perpendicular to the optical axis between the inflection point on the object-side surface of the sixth lens element which is nearest to the optical axis and the optical axis is denoted by HIF611. A distance perpendicular to the optical axis between the inflection point on the image-side surface of the sixth lens element which is nearest to the optical axis and the optical axis is denoted by HIF621. The following relations are satisfied: HIF611=2.24283 mm, HIF611/HOI=0.44857, HIF621=1.07376 mm and HIF621/HOI=0.21475.

A distance perpendicular to the optical axis between the inflection point on the object-side surface of the sixth lens element which is the second nearest to the optical axis and the optical axis is denoted by HIF612. A distance perpendicular to the optical axis between the inflection point on the image-side surface of the sixth lens element which is the second nearest to the optical axis and the optical axis is denoted by HIF622. The following relations are satisfied: HIF612=2.48895 mm and HIF612/HOI=0.49779.

A distance perpendicular to the optical axis between the inflection point on the object-side surface of the sixth lens element which is the third nearest to the optical axis and the optical axis is denoted by HIF613. A distance perpendicular to the optical axis between the inflection point on the image-side surface of the sixth lens element which is the third nearest to the optical axis and the optical axis is denoted by HIF623. The following relations are satisfied: HIF613=0 mm, HIF613/HOI=0, HIF623=0 mm and HIF623/HOI=0.

A distance perpendicular to the optical axis between the inflection point on the object-side surface of the sixth lens element which is the fourth nearest to the optical axis and the optical axis is denoted by HIF614. A distance perpendicular to the optical axis between the inflection point on the image-side surface of the sixth lens element which is the fourth nearest to the optical axis and the optical axis is denoted by HIF624. The following relations are satisfied: HIF614=0 mm, HIF614/HOI=0, HIF624=0 mm and HIF624/HOI=0.

The IR-bandstop filter **180** is made of glass material without affecting the focal length of the optical image capturing system and it is disposed between the sixth lens element **160** and the image plane **190**.

In the optical image capturing system of the first embodiment, a focal length of the optical image capturing system is f, an entrance pupil diameter of the optical image capturing system is HEP, and half of a maximum view angle of the optical image capturing system is HAF. The detailed parameters are shown as below: f=4.075 mm, f/HEP=1.4, HAF=50.001° and tan(HAF)=1.1918.

In the optical image capturing system of the first embodiment, a focal length of the first lens element **110** is f1 and a focal length of the sixth lens element **160** is f6. The following relations are satisfied: f1=−7.828 mm, |f/f1|=0.52060, f6=−4.886 and |f1|>|f6|.

In the optical image capturing system of the first embodiment, focal lengths of the second lens element **120** to the fifth lens element **150** are f2, f3, f4 and f5, respectively. The following relations are satisfied: |f2|+|f3|+|f4|+|f5|=95.50815 mm, |f1|+|f6|=12.71352 mm and |f2|+|f3|+|f4|+|f5|>|f1|+|f6|.

A ratio of the focal length f of the optical image capturing system to a focal length fp of each of lens elements with positive refractive power is PPR. A ratio of the focal length f of the optical image capturing system to a focal length fn of each of lens elements with negative refractive power is NPR. In the optical image capturing system of the first embodiment, a sum of the PPR of all lens elements with positive refractive power is ΣPPR=f/f1+f/f3+f/f5=1.63290. A sum of the NPR of all lens elements with negative refractive powers is ΣNPR=|f/f1|+|f/f3|+|f/f6|=1.51305, ΣPPR/|ΣNPR|=1.07921. The following relations are also satisfied: f/f2|=0.69101, |f/f3|=0.15834, |f/f4|=0.06883, |f/f5|=0.87305 and |f/f6|=0.83412.

In the optical image capturing system of the first embodiment, a distance from the object-side surface **112** of the first lens element to the image-side surface **164** of the sixth lens element is InTL. A distance from the object-side surface **112** of the first lens element to the image plane **190** is HOS. A distance from an aperture **100** to an image plane **190** is InS. Half of a diagonal length of an effective detection field of the image sensing device **192** is HOI. A distance from the image-side surface **164** of the sixth lens element to the image plane **190** is BFL. The following relations are satisfied: InTL+BFL=HOS, HOS=19.54120 mm, HOI=5.0 mm, HOS/HOI=3.90824, HOS/f=4.7952, InS=11.685 mm and InS/HOS=0.59794.

In the optical image capturing system of the first embodiment, a total central thickness of all lens elements with refractive power on the optical axis is ΣTP. The following relations are satisfied: ΣTP=8.13899 mm and ΣTP/InTL=0.52477. Hereby, contrast ratio for the image formation in the optical image capturing system and defect-free rate for manufacturing the lens element can be given consideration simultaneously, and a proper back focal length is provided to dispose other optical components in the optical image capturing system.

In the optical image capturing system of the first embodiment, a curvature radius of the object-side surface **112** of the first lens element is R1. A curvature radius of the image-side surface **114** of the first lens element is R2. The following relation is satisfied: |R1/R2|=8.99987. Hereby, the first lens element may have proper strength of the positive refractive power, so as to avoid the longitudinal spherical aberration to increase too fast.

In the optical image capturing system of the first embodiment, a curvature radius of the object-side surface **162** of the sixth lens element is R11. A curvature radius of the image-side surface **164** of the sixth lens element is R12. The following relation is satisfied: (R11−R12)/(R11+R12)=1.27780. Hereby, the astigmatism generated by the optical image capturing system can be corrected beneficially.

In the optical image capturing system of the first embodiment, a sum of focal lengths of all lens elements with positive refractive power is ΣPP. The following relations are satisfied: ΣPP=f2+f4+f5=69.770 mm and f5/(f2+f4+f5)=0.067. Hereby, it is favorable for allocating the positive refractive power of the first lens element **110** to other positive lens elements and the significant aberrations generated in the process of moving the incident light can be suppressed.

In the optical image capturing system of the first embodiment, a sum of focal lengths of all lens elements with negative refractive power is ΣNP. The following relations are satisfied: ΣNP=f1+f3+f6=−38.451 mm and f6/(f1+f3+f6)=0.127. Hereby, it is favorable for allocating the negative refractive power of the sixth lens element **160** to other negative lens elements and the significant aberrations generated in the process of moving the incident light can be suppressed.

In the optical image capturing system of the first embodiment, a distance between the first lens element **110** and the second lens element **120** on the optical axis is IN12. The following relations are satisfied: IN12=6.418 mm and IN12/f=1.57491. Hereby, the chromatic aberration of the lens elements can be improved, such that the performance can be increased.

In the optical image capturing system of the first embodiment, a distance between the fifth lens element **150** and the sixth lens element **160** on the optical axis is IN56. The following relations are satisfied: IN56=0.025 mm and IN56/f=0.00613. Hereby, the chromatic aberration of the lens elements can be improved, such that the performance can be increased.

In the optical image capturing system of the first embodiment, central thicknesses of the first lens element **110** and the second lens element **120** on the optical axis are TP1 and TP2, respectively. The following relations are satisfied: TP1=1.934 mm, TP2=2.486 mm and (TP1+IN12)/TP2=3.36005. Hereby, the sensitivity produced by the optical image capturing system can be controlled, and the performance can be increased.

In the optical image capturing system of the first embodiment, central thicknesses of the fifth lens element **150** and the sixth lens element **160** on the optical axis are TP5 and TP6, respectively, and a distance between the aforementioned two lens elements on the optical axis is IN56. The following relations are satisfied: TP5=1.072 mm, TP6=1.031 mm and (TP6+IN56)/TP5=0.98555. Hereby, the sensitivity produced by the optical image capturing system can be controlled and the total height of the optical image capturing system can be reduced.

In the optical image capturing system of the first embodiment, a distance between the third lens element **130** and the fourth lens element **140** on the optical axis is IN34. A distance between the fourth lens element **140** and the fifth lens element **150** on the optical axis is IN45. The following relations are satisfied: IN34=0.401 mm, IN45=0.025 mm and TP4/(IN34+TP4+IN45)=0.74376. Hereby, the aberration generated by the process of moving the incident light can be adjusted slightly layer upon layer, and the total height of the optical image capturing system can be reduced.

In the optical image capturing system of the first embodiment, a distance in parallel with an optical axis from a maximum effective half diameter position to an axial point on the object-side surface **152** of the fifth lens element is InRS51. A distance in parallel with an optical axis from a maximum effective half diameter position to an axial point on the image-side surface **154** of the fifth lens element is InRS52. A central thickness of the fifth lens element **150** is TP5. The following relations are satisfied: InRS51=−0.34789 mm, InRS52=−0.88185 mm, |InRS51|/TP5=0.32458 and |InRS52|/TP5=0.82276. Hereby, it is favorable for manufacturing and forming the lens element and for maintaining the minimization for the optical image capturing system.

In the optical image capturing system of the first embodiment, a distance perpendicular to the optical axis between a critical point C51 on the object-side surface **152** of the fifth lens element and the optical axis is HVT51. A distance perpendicular to the optical axis between a critical point C52 on the image-side surface **154** of the fifth lens element and the optical axis is HVT52. The following relations are satisfied: HVT51=0.515349 mm and HVT52=0 mm.

In the optical image capturing system of the first embodiment, a distance in parallel with an optical axis from a maximum effective half diameter position to an axial point on the object-side surface **162** of the sixth lens element is InRS61. A distance in parallel with an optical axis from a maximum effective half diameter position to an axial point on the image-side surface **164** of the sixth lens element is InRS62. A central thickness of the sixth lens element **160** is TP6. The following relations are satisfied: InRS61=−0.58390 mm, InRS62=0.41976 mm, |InRS61|/TP6=0.56616 and |InRS62|/TP6=0.40700. Hereby, it is favorable for manufacturing and forming the lens element and for maintaining the minimization for the optical image capturing system.

In the optical image capturing system of the first embodiment, a distance perpendicular to the optical axis between a critical point C61 on the object-side surface **162** of the sixth lens element and the optical axis is HVT61. A distance perpendicular to the optical axis between a critical point C62 on the image-side surface **164** of the sixth lens element and the optical axis is HVT62. The following relations are satisfied: HVT61=0 mm and HVT62=0 mm.

In the optical image capturing system of the first embodiment, the following relation is satisfied: HVT51/HOI=0.1031. Hereby, the aberration of surrounding view field can be corrected.

In the optical image capturing system of the first embodiment, the following relation is satisfied: HVT51/HOS=0.02634. Hereby, the aberration of surrounding view field can be corrected.

In the optical image capturing system of the first embodiment, the second lens element **120**, the third lens element **130** and the sixth lens element **160** have negative refractive power. An Abbe number of the second lens element is NA2. An Abbe number of the third lens element is NA3. An Abbe number of the sixth lens element is NA6. The following relation is satisfied: NA6/NA2≤1. Hereby, the chromatic aberration of the optical image capturing system can be corrected.

In the optical image capturing system of the first embodiment, TV distortion and optical distortion for image formation in the optical image capturing system are TDT and ODT, respectively. The following relations are satisfied: |TDT|=2.124% and |ODT|=5.076%.

In the optical image capturing system of the first embodiment, a lateral aberration of the longest operation wavelength of a visible light of a positive direction tangential fan of the optical image capturing system passing through an edge of the aperture and incident on the image plane by 0.7 view field is denoted as PLTA, which is 0.006 mm. A lateral aberration of the shortest operation wavelength of a visible light of the positive direction tangential fan of the optical image capturing system passing through the edge of the aperture and incident on the image plane by 0.7 view field is denoted as PSTA, which is 0.005 mm. A lateral aberration of the longest operation wavelength of a visible light of a negative direction tangential fan of the optical image capturing system passing through the edge of the aperture and incident on the image plane by 0.7 view field is denoted as NLTA, which is 0.004 mm. A lateral aberration of the shortest operation wavelength of a visible light of a negative direction tangential fan of the optical image capturing system passing through the edge of the aperture and incident on the image plane by 0.7 view field is denoted as NSTA, which is −0.007 mm. A lateral aberration of the longest operation wavelength of a visible light of a sagittal fan of the optical image capturing system passing through the edge of the aperture and incident on the image plane by 0.7 view field is denoted as SLTA, which is −0.003 mm. A lateral aberration of the shortest operation wavelength of a visible light of the sagittal fan of the optical image capturing system passing through the edge of the aperture and incident on the image plane by 0.7 view field is denoted as SSTA, which is 0.008 mm.

Please refer to the following Table 1 and Table 2.

The detailed data of the optical image capturing system of the first embodiment is as shown in Table 1.

TABLE 1

Data of the optical image capturing system f = 4.075 mm, f/HEP = 1.4, HAF = 50.000 deg							
Surface #		Curvature Radius	Thickness	Material	Index	Abbe #	Focal length
0	Object	Plano	Plano				
1	Lens 1	−40.99625704	1.934	Plastic	1.515	56.55	−7.828
2		4.555209289	5.923				
3	Ape. stop	Plano	0.495				
4	Lens 2	5.333427366	2.486	Plastic	1.544	55.96	5.897
5		−6.781659971	0.502				
6	Lens 3	−5.697794287	0.380	Plastic	1.642	22.46	−25.738
7		−8.883957518	0.401				
8	Lens 4	13.19225664	1.236	Plastic	1.544	55.96	59.205
9		21.55681832	0.025				
10	Lens 5	8.987806345	1.072	Plastic	1.515	56.55	4.668
11		−3.158875374	0.025				
12	Lens 6	−29.46491425	1.031	Plastic	1.642	22.46	−4.886
13		3.593484273	2.412				
14	IR-bandstop filter	Plano	0.200		1.517	64.13	
15		Plano	1.420				
16	Image plane	Plano					

Reference wavelength (d-line) = 555 nm; shield position: The clear aperture of the first surface is 5.800 mm. The clear aperture of the third surface is 1.570 mm. The clear aperture of the fifth surface is 1.950 mm.

As for the parameters of the aspheric surfaces of the first embodiment, reference is made to Table 2.

TABLE 2

Aspheric Coefficients							
	Surface #						
	1	2	4	5	6	7	8
k	4.310876E+01	−4.707622E+00	2.616025E+00	2.445397E+00	5.645686E+00	−2.117147E+01	−5.287220E+00
A4	7.054243E−03	1.714312E−02	−8.377541E−03	−1.789549E−02	−3.379055E−03	−1.370959E−02	−2.937377E−02
A6	−5.233264E−04	−1.502232E−04	−1.838068E−03	−3.657520E−03	−1.225453E−03	6.250200E−03	2.743532E−03
A8	3.077890E−05	−1.359611E−04	1.233332E−03	−1.131622E−03	−5.979572E−03	−5.854426E−03	−2.457574E−03
A10	−1.260650E−06	2.680747E−05	−2.390895E−03	1.390351E−03	4.556449E−03	4.049451E−03	1.874319E−03
A12	3.319093E−08	−2.017491E−06	1.998555E−03	−4.152857E−04	−1.177175E−03	−1.314592E−03	−6.013661E−04
A14	−5.051600E−10	6.604615E−08	−9.734019E−04	5.487286E−05	1.370522E−04	2.143097E−04	8.792480E−05
A16	3.380000E−12	−1.301630E−09	2.478373E−04	−2.919339E−06	−5.974015E−06	−1.399894E−05	−4.770527E−06

	Surface #				
	9	10	11	12	13
k	6.200000E+01	−2.114008E+01	−7.699904E+00	−6.155476E+01	−3.120467E−01
A4	−1.359965E−01	−1.263831E−01	−1.927804E−02	−2.492467E−02	−3.521844E−02
A6	6.628518E−02	6.965399E−02	2.478376E−03	−1.835360E−03	5.629654E−03
A8	−2.129167E−02	−2.116027E−02	1.438785E−03	3.201343E−03	−5.466925E−04
A10	4.396344E−03	3.819371E−03	−7.013749E−04	−8.990757E−04	2.231154E−05
A12	−5.542899E−04	−4.040283E−04	1.253214E−04	1.245343E−04	5.548990E−07
A14	3.768879E−05	2.280473E−05	−9.943196E−06	−8.788363E−06	−9.396920E−08
A16	−1.052467E−06	−5.165452E−07	2.898397E−07	2.494302E−07	2.728360E−09

The numerical related to the length of outline curve is shown according to table 1 and table 2.

First embodiment (Reference wavelength = 555 nm)						
ARE	1/2(HEP)	ARE value	ARE − 1/2(HEP)	2(ARE/HEP) %	TP	ARE/TP (%)
11	1.455	1.455	−0.00033	99.98%	1.934	75.23%
12	1.455	1.495	0.03957	102.72%	1.934	77.29%
21	1.455	1.465	0.00940	100.65%	2.486	58.93%
22	1.455	1.495	0.03950	102.71%	2.486	60.14%
31	1.455	1.486	0.03045	102.09%	0.380	391.02%
32	1.455	1.464	0.00830	100.57%	0.380	385.19%
41	1.455	1.458	0.00237	100.16%	1.236	117.95%
42	1.455	1.484	0.02825	101.94%	1.236	120.04%

-continued

First embodiment (Reference wavelength = 555 nm)						
51	1.455	1.462	0.00672	100.46%	1.072	136.42%
52	1.455	1.499	0.04335	102.98%	1.072	139.83%
61	1.455	1.465	0.00964	100.66%	1.031	142.06%
62	1.455	1.469	0.01374	100.94%	1.031	142.45%
ARS	EHD	ARS value	ARS − EHD	(ARS/EHD) %	TP	ARS/TP (%)
11	5.800	6.141	0.341	105.88%	1.934	317.51%
12	3.299	4.423	1.125	134.10%	1.934	228.70%
21	1.664	1.674	0.010	100.61%	2.486	67.35%
22	1.950	2.119	0.169	108.65%	2.486	85.23%
31	1.980	2.048	0.069	103.47%	0.380	539.05%
32	2.084	2.101	0.017	100.83%	0.380	552.87%
41	2.247	2.287	0.040	101.80%	1.236	185.05%
42	2.530	2.813	0.284	111.22%	1.236	227.63%
51	2.655	2.690	0.035	101.32%	1.072	250.99%
52	2.764	2.930	0.166	106.00%	1.072	273.40%
61	2.816	2.905	0.089	103.16%	1.031	281.64%
62	3.363	3.391	0.029	100.86%	1.031	328.83%

Table 1 is the detailed structure data to the first embodiment in FIG. **1**A, wherein the unit of the curvature radius, the thickness, the distance, and the focal length is millimeters (mm). Surfaces 0-16 illustrate the surfaces from the object side to the image plane in the optical image capturing system. Table 2 is the aspheric coefficients of the first embodiment, wherein k is the conic coefficient in the aspheric surface formula, and A1-A20 are the first to the twentieth order aspheric surface coefficient. Besides, the tables in the following embodiments are referenced to the schematic view and the aberration graphs, respectively, and definitions of parameters in the tables are equal to those in the Table 1 and the Table 2, so the repetitious details will not be given here.

The Second Embodiment (Embodiment 2)

Please refer to FIG. **2**A, FIG. **2**B and FIG. **2**C, FIG. **2**A is a schematic view of the optical image capturing system according to the second embodiment of the present application. FIG. **2**B is longitudinal spherical aberration curves, astigmatic field curves, and an optical distortion curve of the optical image capturing system in the order from left to right according to the second embodiment of the present application, and FIG. **2**C is a lateral aberration diagram of tangential fan, sagittal fan, the longest operation wavelength and the shortest operation wavelength passing through an edge of the entrance pupil and incident on the image plane by 0.7 HOI according to the second embodiment of the present application. As shown in FIG. **2**A, in order from an object side to an image side, the optical image capturing system includes a first lens element **210**, a second lens element **220**, a third lens element **230**, an aperture stop **200**, a fourth lens element **240**, a fifth lens element **250**, a sixth lens element **260**, an IR-bandstop filter **280**, an image plane **290**, and an image sensing device **292**.

The first lens element **210** has negative refractive power and it is made of glass material. The first lens element **210** has a convex object-side surface **212** and a concave image-side surface **214**, and both of the object-side surface **212** and the image-side surface **214** are aspheric.

The second lens element **220** has negative refractive power and it is made of plastic material. The second lens element **220** has a concave object-side surface **222** and a concave image-side surface **224**, and both of the object-side surface **222** and the image-side surface **224** are aspheric.

The third lens element **230** has positive refractive power and it is made of plastic material. The third lens element **230** has a convex object-side surface **232** and a convex image-side surface **234**, and both of the object-side surface **232** and the image-side surface **234** are aspheric. The image-side surface **234** has an inflection point.

The fourth lens element **240** has positive refractive power and it is made of glass material. The fourth lens element **240** has a convex object-side surface **242** and a convex image-side surface **244**, and both of the object-side surface **242** and the image-side surface **244** are aspheric.

The fifth lens element **250** has negative refractive power and it is made of glass material. The fifth lens element **250** has a concave object-side surface **252** and a convex image-side surface **254**, and both of the object-side surface **252** and the image-side surface **254** are aspheric.

The sixth lens element **260** has positive refractive power and it is made of plastic material. The sixth lens element **260** has a convex object-side surface **262** and a concave image-side surface **264**. The object-side surface **262** and the image-side surface **264** both have an inflection point. Hereby, the back focal length is reduced to miniaturize the lens element effectively. In addition, the angle of incident with incoming light front an off-axis view field can be suppressed effectively and the aberration in the off-axis view field can be corrected further.

The IR-bandstop filter **280** is made of glass material without affecting the focal length of the optical image capturing system and it is disposed between the sixth lens element **260** and the image plane **290**.

In the optical image capturing system of the second embodiment, a sum of focal lengths of all lens elements with positive refractive power is ΣPP. The following relation is satisfied: ΣPP=39.138 mm and f4/ΣPP=0.225. Hereby, it is favorable for allocating the positive refractive power of a single lens element to other positive lens elements and the significant aberrations generated in the process of moving the incident light can be suppressed.

In the optical image capturing system of the second embodiment, a sum of focal lengths of all lens elements with negative refractive power is ΣNP. The following relation is satisfied: ΣNP=−53.360 mm and f1/ΣNP=0.445. Hereby, it is favorable for allocating the negative refractive power of a single lens element to other negative lens elements.

Please refer to the following Table 3 and Table 4.

The detailed data of the optical image capturing system of the second embodiment is as shown in Table 3.

TABLE 3

Data of the optical image capturing system f = 2.735 mm; f/HEP = 1.4; HAF = 100 deg							
Surface #		Curvature Radius	Thickness	Material	Index	Abbe #	Focal length
0	Object	Plano	At infinity				
1	Lens 1	64.68576	1.925649	Glass	1.51633	64.1	−23.7643
2		10.23352	6.73208				
3	Lens 2	−87.4711	2.680546	Plastic	1.565	58	−7.13993
4		4.29011	3.15605				
5	Lens 3	16.43326	2.71495	Plastic	1.65	21.4	16.3597
6		−28.8397	9.284019				
7	Ape. stop	Plano	0.965764				
8	Lens 4	10.60194	4.246021	Glass	1.497	81.61	8.794
9		−6.4705	0				
10	Lens 5	−6.4705	0.3	Glass	2.00178	19.32	−22.4555
11		−9.25725	1.936724				
12	Lens 6	7.51081	8.536279	Plastic	1.565	58	13.9846
13		84.39847	1				
14	IR-bandstop filter	Plano	0.85	BK_7	1.517	64.13	
15		Plano	0.677510				
16	Image plane	Plano					

Reference wavelength (d-line) = 555 nm

As for the parameters of the aspheric surfaces of the second embodiment, reference is made to Table 4.

TABLE 4

Aspheric Coefficients							
	Surface #						
	1	2	3	4	5	6	8
k	0.000000E+00	0.000000E+00	1.569562	−0.726312	−0.468219	−35.841629	0.000000E+00
A4	0.000000E+00	0.000000E+00	1.21609E−05	−2.24545E−04	1.70195E−04	−2.22348E−05	0.000000E+00
A6	0.000000E+00	0.000000E+00	−7.57340E−07	2.35611E−06	3.18952E−06	1.33616E−06	0.000000E+00
A8	0.000000E+00	0.000000E+00	2.15335E−09	4.21195E−08	2.51224E−08	3.89089E−08	0.000000E+00
A10	0.000000E+00	0.000000E+00	−1.81730E−11	−4.71613E−09	1.58208E−09	7.32386E−10	0.000000E+00

	Surface #				
	9	10	11	12	13
k	0.000000E+00	0.000000E+00	0.000000E+00	−0.647875	50
A4	0.000000E+00	0.000000E+00	0.000000E+00	−5.26069E−05	2.50535E−03
A6	0.000000E+00	0.000000E+00	0.000000E+00	−1.40961E−07	−2.35354E−05
A8	0.000000E+00	0.000000E+00	0.000000E+00	−1.84368E−09	3.01405E−06
A10	0.000000E+00	0.000000E+00	0.000000E+00	−2.59433E−09	−2.23096E−07

In the second embodiment, the presentation of the aspheric surface formula is similar to that in the first embodiment. Besides, the definitions of parameters in following tables are equal to those in the first embodiment, so the repetitious details will not be given here.

The following contents may be deduced from Table 3 and Table 4.

Second embodiment (Primary reference wavelength = 587.5 nm)					
|f/f1|	|f/f2|	|f/f3|	|f/f4|	|f/f5|	|f/f6|
0.11508	0.38304	0.16717	0.31099	0.12179	0.19556
Σ PPR	Σ NPR	Σ PPR/|Σ NPR|	IN12/f	IN56/f	TP4/(IN34 + TP4 + IN45)
0.67373	0.61991	1.08681	2.46157	0.70816	0.29291

-continued

Second embodiment (Primary reference wavelength = 587.5 nm)					
|f1/f2|	|f2/f3|	(TP1 + IN12)/TP2		(TP6 + IN56)/TP5	
3.32837	0.43643	3.22983		34.91000	
HOS	InTL	HOS/HOI	InS/HOS	ODT %	TDT %
45.00000	42.47810	11.27820	0.41126	−120.35600	98.17900
HVT51	HVT52	HVT61	HVT62	HVT62/HOI	HVT62/HOS
0	0	0.00000	0.00000	0.00000	0.00000
TP2/TP3	TP3/TP4	InRS61	InRS62	|InRS61|/TP6	|InRS62|/TP6
0.98733	0.63941	1.91828	0.65247	0.22472	0.07644

-continued

Second embodiment (Primary reference wavelength = 587.5 nm)					
PSTA	PLTA	NSTA	NLTA	SSTA	SLTA
0.017 mm	−0.003 mm	0.002 mm	0.008 mm	0.008 mm	0.001 mm

The numerical related to the length of outline curve is shown according to table 3 and table 4.

Second embodiment (Reference wavelength = 587.5 nm)						
ARE	1/2(HEP)	ARE value	ARE − 1/2(HEP)	2(ARE/HEP) %	TP	ARE/TP (%)
11	0.977	0.976	−0.00070	99.93%	1.926	50.69%
12	0.977	0.977	0.00075	100.08%	1.926	50.76%
21	0.977	0.976	−0.00072	99.93%	2.681	36.41%
22	0.977	0.984	0.00765	100.78%	2.681	36.72%
31	0.977	0.977	−0.00016	99.98%	2.715	35.97%
32	0.977	0.976	−0.00056	99.94%	2.715	35.96%
41	0.977	0.977	0.00064	100.07%	4.246	23.02%
42	0.977	0.980	0.00300	100.31%	4.246	23.07%
51	0.977	0.980	0.00300	100.31%	0.300	326.58%
52	0.977	0.978	0.00108	100.11%	0.300	325.94%
61	0.977	0.979	0.00201	100.21%	8.536	11.47%
62	0.977	0.976	−0.00069	99.93%	8.536	11.43%
ARS	EHD	ARS value	ARS − EHD	(ARS/EHD) %	TP	ARS/TP (%)
11	16.981	17.181	0.200	101.18%	1.926	892.23%
12	9.192	11.415	2.223	124.19%	1.926	592.81%
21	8.840	8.892	0.052	100.58%	2.681	331.72%
22	6.021	7.934	1.913	131.77%	2.681	295.98%
31	6.108	6.485	0.377	106.17%	2.715	238.85%
32	5.979	5.993	0.014	100.23%	2.715	220.73%
41	4.334	4.464	0.130	103.00%	4.246	105.13%
42	4.559	5.059	0.500	110.96%	4.246	119.14%
51	4.559	5.059	0.500	110.96%	0.300	1686.29%
52	4.838	5.090	0.252	105.20%	0.300	1696.52%
61	5.335	5.750	0.415	107.78%	8.536	67.36%
62	4.089	4.176	0.087	102.13%	8.536	48.92%

The following contents may be deduced from Table 3 and Table 4.

Related inflection point values of second embodiment (Primary reference wevelength: 555 nm)							
HIF321	3.9045	HIF321/HOI	0.9786	SGI321	−0.2296	|SGI321|/(|SGI321| + TP3)	0.0780
HIF611	5.3418	HIF611/HOI	1.3388	SGI611	1.8962	|SGI611|/(|SGI611| + TP6)	0.1818
HIF621	3.7272	HIF621/HOI	0.9341	SGI621	0.5017	|SGI621|/(|SGI621| + TP6)	0.0555

The Third Embodiment (Embodiment 3)

Please refer to FIG. **3**A, FIG. **3**B and FIG. **3**C, FIG. **3**A is a schematic view of the optical image capturing system according to the third embodiment of the present application, FIG. **3**B is longitudinal spherical aberration curves, astigmatic field curves, and an optical distortion curve of the optical image capturing system in the order from left to right according to the third embodiment of the present application, and FIG. **3**C is a lateral aberration diagram of tangential fan, sagittal fan, the longest operation wavelength and the shortest operation wavelength passing through an edge of the entrance pupil and incident on the image plane by 0.7 HOI according to the third embodiment of the present application. As shown in FIG. **3**A, in order from an object side to an image side, the optical image capturing system includes a first lens element **310**, a second lens element **320**, an third lens element **330**, an aperture stop **300**, a fourth lens element **340**, as fifth lens element **350**, a sixth lens element **360**, an IR-bandstop filter **380**, an image plane **390**, and an image sensing device **392**.

The first lens element **310** has negative refractive power and it is made of glass material. The first lens element **310** has a convex object-side surface **312** and a concave image-side surface **314**, and both of the object-side surface **312** and the image-side surface **314** are aspheric.

The second lens element **320** has negative refractive power and it is made of glass material. The second lens element **320** has a convex object-side surface **322** and a concave image-side surface **324**, and both of the object-side surface **322** and the image-side surface **324** are aspheric.

The third lens element **330** has negative refractive power and it is made of plastic material. The third lens element **330** has a concave object-side surface **332** and a concave image-side surface **334**, and both of the object-side surface **332** and the image-side surface **334** are aspheric.

The fourth lens element **340** has positive refractive power and it is made of glass material. The fourth lens element **340** has a convex object-side surface **342** and a convex image-side surface **344**, and both of the object-side surface **342** and the image-side surface **344** are aspheric.

The fifth lens element **350** has positive refractive power and it is made of plastic material. The fifth lens element **350** has a convex object-side surface **352** and a convex image-side surface **354**, and both of the object-side surface **352** and the image-side surface **354** are aspheric. The object-side surface **352** has an inflection point.

The sixth lens element **360** has negative refractive power and it is made of plastic material. The sixth lens element **360** has a concave object-side surface **362** and a concave image-side surface **364**. The object-side surface **362** and the image-side surface **364** both have an inflection point. Hereby, the back focal length is reduced to miniaturize the lens element effectively. In addition, the angle of incident with incoming light front an off-axis view field can be suppressed effectively and the aberration in the off-axis view field can be corrected further.

The IR-bandstop filter **380** is made of glass material without affecting the focal length of the optical image capturing system and it is disposed between the sixth lens element **360** and the image plane **390**.

In the optical image capturing system of the third embodiment, a sum of focal lengths of all lens elements with positive refractive power is ΣPP. The following relation is satisfied: ΣPP=17.313 mm and f4/ΣPP=0.529. Hereby, it is favorable for allocating the positive refractive power of a single lens element to other positive lens elements and the significant aberrations generated in the process of moving the incident light can be suppressed.

In the optical image capturing system of the third embodiment, at sum of focal lengths of all lens elements with negative refractive power is ΣNP. The following relation is satisfied: ΣNP=−103.166 mm and f1/ΣNP=0.113. Hereby, it is favorable for allocating the negative refractive power of a single lens element to other negative lens elements.

Please refer to the following Table 5 and Table 6.

The detailed data of the optical image capturing system of the third embodiment is as shown in Table 5.

TABLE 5

Data of the optical image capturing, system
f = 3.40816 mm; f/HEP = 1.6; HAF = 90.05 deg

Surface#		Curvature Radius	Thickness	Material	Index	Abbe #	Focal length
0	Object	Plano	At infinity				
1	Lens 1	66.77321	2.232047	Glass	1.497	81.61	−11.6113
2		5.26359	2.477945				
3	Lens 2	18.41423	0.853001	Glass	1.51633	64.1	−14.5
4		5.2492	1.837199				
5	Lens 3	−104.47	8.795838	Plastic	1.65	21.4	−60.8831
6		66.72218	0.058462				
7	Ape. stop	Plano	0.052067				
8	Lens 4	9.30752	2.404947	Glass	1.497	81.61	9.15347
9		−8.17008	1.512149				
10	Lens 5	5.82652	3.07992	Plastic	1.565	58	8.15903
11		−18.1274	0.554318				
12	Lens 6	−11.2323	0.622305	Plastic	1.65	21.4	−16.1715
13		192.2671	1				
14	IR-bandstop filter	Plano	0.85	BK_7	1.517	64.13	
15		Plano	3.662281				
16	Image plane	Plano					

Reference wavelength (d-line) = 555 nm

As for the parameters of the aspheric surfaces of the third embodiment, reference is made to Table 6.

TABLE 6

Aspheric Coefficients

Surface #	1	2	3	4	5	6	8
k	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	−8.95217	−28.897867	0.000000E+00
A4	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	−1.06346E−03	−2.63319E−04	0.000000E+00
A6	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	−5.48917E−05	2.70072E−05	0.000000E+00
A8	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	1.16564E−06	9.21640E−08	0.000000E+00
A10	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	−1.24968E−07	9.00631E−09	0.000000E+00

Surface #	9	10	11	12	13
k	0.000000E+00	−4.590841	2.805394	−5.647697	19.519685
A4	0.000000E+00	1.83242E−03	−2.81557E−03	−1.07933E−03	3.13280E−03
A6	0.000000E+00	−1.01493E−04	9.02524E−05	5.02717E−05	−4.58211E−05
A8	0.000000E+00	1.29923E−08	1.79522E−06	9.97081E−06	2.44375E−06
A10	0.000000E+00	−3.13883E−08	−1.05969E−07	−3.60233E−07	−1.68579E−07

The presentation of the aspheric surface formula in the third embodiment is similar to that in the first embodiment. Besides, the definitions of parameters in following tables are equal to those in the first embodiment so the repetitious details will not be given here.

The following contents may be deduced from Table 5 and Table 6.

Third embodiment (Primary reference wavelength: 555 nm)					
|f/f1|	|f/f2|	|f/f3|	|f/f4|	|f/f5|	|f/f6|
0.29352	0.23505	0.05598	0.37234	0.41772	0.21075
Σ PPR	Σ NPR	Σ PPR/|Σ NPR|	IN12/f	IN56/f	TP4/(IN34 + TP4 + IN45)
0.42831	0.79530	0.53856	0.72706	0.16264	0.59711

-continued

Third embodiment (Primary reference wavelength: 555 nm)					
|f1/f2|	|f2/f3|	(TP1 + IN12)/TP2		(TP6 + IN56)/TP5	
0.80078	0.23816	5.52168		0.38203	
HOS	InTL	HOS/HOI	InS/HOS	ODT %	TDT %
29.99240	24.48020	7.52632	0.45805	−97.17900	75.37130
HVT51	HVT52	HVT61	HVT62	HVT62/HOI	HVT62/HOS
0	0	3.66864	0.00000	0.00000	0.00000
TP2/TP3	TP3/TP4	InRS61	InRS62	|InRS61|/TP6	|InRS62|/TP6
0.09698	3.65739	−0.40351	0.59825	0.64841	0.96135
PSTA	PLTA	NSTA	NLTA	SSTA	SLTA
−0.001 mm	0.010 mm	0.002 mm	0.002 mm	0.006 mm	0.002 mm

The numerical related to the length of outline curve is shown according to table 5 and table 6.

Third embodiment (Reference wavelength = 587.5 nm)						
ARE	1/2(HEP)	ARE value	ARE − 1/2(HEP)	2(ARE/HEP) %	TP	ARE/TP (%)
11	1.065	1.065	−0.00001	100.00%	2.232	47.72%
12	1.065	1.072	0.00735	100.69%	2.232	48.05%
21	1.065	1.066	0.00054	100.05%	0.853	124.92%
22	1.065	1.072	0.00739	100.69%	0.853	125.73%
31	1.065	1.065	−0.00002	100.00%	8.796	12.11%
32	1.065	1.065	−0.00001	100.00%	8.796	12.11%
41	1.065	1.067	0.00229	100.21%	2.405	44.38%
42	1.065	1.068	0.00299	100.28%	2.405	44.41%
51	1.065	1.071	0.00577	100.54%	3.080	34.77%
52	1.065	1.066	0.00074	100.07%	3.080	34.60%
61	1.065	1.067	0.00160	100.15%	0.622	171.40%
62	1.065	1.065	−0.0001	100.00%	0.622	171.14%
ARS	EHD	ARS value	ARS − EHD	(ARS/EHD) %	TP	ARS/TP (%)
11	9.720	9.754	0.034	100.35%	2.232	436.98%
12	4.693	5.794	1.101	123.47%	2.232	259.60%
21	4.550	4.597	0.047	101.03%	0.853	538.87%
22	3.547	3.893	0.346	109.77%	0.853	456.42%
31	3.482	3.516	0.033	100.96%	8.796	39.97%
32	2.870	2.870	0.00021	100.01%	8.796	32.63%
41	3.505	3.594	0.089	102.53%	2.405	149.43%
42	3.718	3.860	0.142	103.81%	2.405	160.50%
51	4.211	4.378	0.168	103.98%	3.080	142.15%
52	4.289	4.439	0.150	103.50%	3.080	144.14%
61	4.095	4.131	0.035	100.87%	0.622	663.76%
62	3.835	3.915	0.080	102.08%	0.622	629.07%

The following contents may be deduced from Table 5 and Table 6.

Related inflection point values of third embodiment (Primary reference wevelength: 555 nm)							
HIF511	2.9861	HIF511/HOI	0.7493	SGI511	0.7113	|SGI511|/(|SGI511| + TP5)	0.1876
HIF611	2.5020	HIF611/HOI	0.6279	SGI611	−0.2823	|SGI611|/(|SGI611| + TP6)	#REF!
HIF621	3.8179	HIF621/HOI	0.9581	SGI621	0.5611	|SGI621|/(|SGI621| + TP6)	#REF!

The Fourth Embodiment (Embodiment 4)

Please refer to FIG. **4**A, FIG. **4**B and FIG. **4**C, FIG. **4**A is a schematic view of the optical image capturing system according to the fourth embodiment of the present application, FIG. **4**B is longitudinal spherical aberration curves, astigmatic field curves, and an optical distortion curve of the optical image capturing system in the order from left to right according to the fourth embodiment of the present application, and FIG. **4**C is a lateral aberration diagram of tangential fan, sagittal fan, the longest operation wavelength and the shortest operation wavelength passing through an edge of the entrance pupil and incident on the image plane by 0.7 HOI according to the fourth embodiment of the present application. As shown in FIG. **4**A, in order from an object side to an image side, the optical image capturing system includes a first lens element **410**, a second lens element **420**, a third lens element **430**, an aperture stop **400**, a fourth lens element **440**, a fifth lens element **450**, a sixth lens element **460**, an IR-bandstop filter **480**, an image plane **490**, and an image sensing device **492**.

The first lens element **410** has negative refractive power and it is made of glass material. The first lens element **410** has a convex object-side surface **412** and a concave image-side surface **414**, and both of the object-side surface **412** and the image-side surface **414** are aspheric.

The second lens element **420** has negative refractive power and it is made of plastic material. The second lens element **420** has a convex object-side surface **422** and a concave image-side surface **424**, and both of the object-side surface **422** and the image-side surface **424** are aspheric. The object-side surface **422** has an inflection point.

The third lens element **430** has positive refractive power and it is made of glass material. The third lens element **430** has a convex object-side surface **432** and a concave image-side surface **434**, and both of the object-side surface **432** and the image-side surface **434** are aspheric.

The fourth lens element **440** has positive refractive power and it is made of plastic material. The fourth lens element **440** has a convex object-side surface **442** and a convex image-side surface **444**, and both of the object-side surface **442** and the image-side surface **444** are aspheric. The object-side surface **442** has an inflection point.

The fifth lens element **450** has positive refractive power and it is made of glass material. The fifth lens element **450** has a convex object-side surface **452** and a convex image-side surface **454**, and both of the object-side surface **452** and the image-side surface **454** are aspheric.

The sixth lens element **460** has positive refractive power and it is made of plastic material. The sixth lens element **460** has a convex object-side surface **462** and a concave image-side surface **464**. The object-side surface **462** has an inflection point and the image-side surface **464** has two inflection points. Hereby, the back focal length is reduced to miniaturize the lens element effectively. In addition, the angle of incident with incoming light from an off-axis view field can be suppressed effectively and the aberration in the off-axis view field can be corrected further.

The IR-bandstop filter **480** is made of plastic material without affecting the focal length of the optical image capturing system and it is disposed between the sixth lens element **460** and the image plane **490**.

In the optical image capturing system of the fourth embodiment, a sum of focal lengths of all lens elements with positive refractive power is ΣPP. The following relation is satisfied: ΣPP=111.293 mm and f4/ΣPP=0.065. Hereby, it is favorable for allocating the positive refractive power of a single lens element to other positive lens elements and the significant aberrations generated in the process of moving the incident light can be suppressed.

In the optical image capturing system of the fourth embodiment, a sum of focal lengths of all lens elements with negative refractive power is ΣNP. The following relation is satisfied: ΣNP=−22.659 mm and f1/ΣNP=0.672. Hereby, it is favorable for allocating the negative refractive power of a single lens element to other negative lens elements.

Please refer to the following Table 7 and Table 8.

The detailed data of the optical image capturing system of the fourth embodiment is as shown in Table 7.

TABLE 7

Data of the optical image capturing system
f = 2.460 mm; f/HEP = 1.6; HAF = 70.00 deg

Surface #		Curvature Radius	Thickness	Material	Index	Abbe #	Focal length
0	Object	Plano	At infinity				
1	Lens 1	561.8807	1.781331	Glass	1.497	81.61	−15.2173
2		7.47121	1.351266				
3	Lens 2	11.11563	2.699904	Plastic	1.565	54.5	−7.4418
4		2.78934	3.099904				
5	Lens 3	13.82223	9.974673	Glass	2.00272	19.32	65.9907
6		11.10334	0.28217				
7	Ape. stop	Plano	0.05				
8	Lens 4	6.91461	1.422216	Plastic	1.565	58	7.24079
9		−9.34498	0.05				
10	Lens 5	5.71659	2.221029	Glass	1.497	81.61	7.96895
11		−11.3103	2.649626				
12	Lens 6	13.86023	3.038935	Plastic	1.65	21.4	30.0923
13		42.57531	0.5				
14	IR-band stop filter	Plano	0.85	BK_7	1.517	64.13	
15		Plano	0.028959				
16	Image plane	Plano					

Reference wavelength (d-line) = 555 nm

As for the parameters of the aspheric surfaces of the fourth embodiment, reference is made to Table 8.

TABLE 8

Aspheric Coefficients							
	Surface #						
	3	4	5	6	8	9	10
k	−2.895753E+00	−5.305419E−01	0.000000E+00	0.000000E+00	1.287252E+00	−7.238133E−02	−1.102549E+00
A4	−6.872493E−04	−5.196963E−04	0.000000E+00	0.000000E+00	4.118629E−04	8.346616E−05	−3.694356E−04
A6	−5.713381E−05	−9.126514E−05	0.000000E+00	0.000000E+00	−1.136292E−05	3.769059E−06	−6.297694E−05
A8	−4.922138E−07	7.401893E−06	0.000000E+00	0.000000E+00	−2.276806E−06	−9.982125E−07	2.259523E−06
A10	4.379280E−08	−1.324272E−06	0.000000E+00	0.000000E+00	9.598033E−08	7.401288E−08	−4.631574E−07

	Surface #		
	11	12	13
k	−3.507269E−02	8.157804E−02	−1.679229E+01
A4	−3.892551E−04	2.276216E−03	1.527674E−03
A6	4.799095E−05	1.211605E−04	6.710888E−05
A8	8.167494E−06	−4.236754E−07	−4.237391E−06
A10	−3.644669E−07	3.715526E−07	4.259586E−08

The presentation of the aspheric surface formula in the fourth embodiment is similar to that in the first embodiment. Besides the definitions of parameters in following tables are equal to those in the first embodiment so the repetitious details will not be given here.

The following contents may be deduced from Table 7 and Table 8.

Fourth embodiment (Primary reference wavelength: 587.5 nm)					
|f/f1|	|f/f2|	|f/f3|	|f/f4|	|f/f5|	|f/f6|
0.16168	0.33062	0.03728	0.33980	0.30875	0.08176
Σ PPR	Σ NPR	Σ PPR/|Σ NPR|	IN12/f	IN56/f	TP4/(IN34 + TP4 + IN45)
0.91528	0.49230	1.85917	0.54921	1.07691	0.78820
|f1/f2|	|f2/f3|	(TP1 + IN12)/TP2		(TP6 + IN56)/TP5	
2.04484	0.11277	1.16027		2.56123	

-continued

Fourth embodiment (Primary reference wavelength: 587.5 nm)					
HOS	InTL	HOS/HOI	InS/HOS	ODT %	TDT %
30.00000	28.62110	7.50000	0.36036	−40.79820	32.74790
HVT51	HVT52	HVT61	HVT62	HVT62/HOI	HVT62/HOS
0	0	1.53515	1.74017	0.43504	0.05801
TP2/TP3	TP3/TP4	InRS61	InRS62	|InRS61|/TP6	|InRS62|/TP6
0.27068	7.01345	−0.36379	−0.43648	0.11971	0.14363
PSTA	PLTA	NSTA	NLTA	SSTA	SLTA
−0.018 mm	0.019 mm	−0.010 mm	0.004 mm	0.005 mm	0.008 mm

The numerical related to the length of outline curve is shown according to table 7 and table 8.

Fourth embodiment (Reference wavelength = 587.5 nm)						
ARE	1/2(HEP)	ARE value	ARE − 1/2(HEP)	2(ARE/HEP) %	TP	ARE/TP (%)
11	0.769	0.768	−0.00088	99.89%	1.781	43.11%
12	0.769	0.769	0.00048	100.06%	1.781	43.19%
21	0.769	0.769	−0.00025	99.97%	2.700	28.47%
22	0.769	0.778	0.00895	101.16%	2.700	28.81%
31	0.769	0.768	−0.00048	99.94%	9.975	7.70%
32	0.769	0.769	−0.00026	99.97%	9.975	7.71%
41	0.769	0.770	0.00066	100.09%	1.422	54.11%
42	0.769	0.769	−0.00000	100.00%	1.422	54.06%
51	0.769	0.770	0.00145	100.19%	2.221	34.68%
52	0.769	0.769	−0.00028	99.96%	2.221	34.61%
61	0.769	0.768	−0.00057	99.93%	3.039	25.28%
62	0.769	0.768	−0.00084	99.89%	3.039	25.27%
ARS	EHD	ARS value	ARS − EHD	(ARS/EHD) %	TP	ARS/TP (%)
11	10.933	10.933	0.00011	100.00%	1.781	613.74%
12	6.463	7.807	1.345	120.80%	1.781	438.29%
21	6.408	7.020	0.612	109.54%	2.700	260.00%
22	4.108	5.796	1.687	141.07%	2.700	214.66%

-continued

Fourth embodiment (Reference wavelength = 587.5 nm)						
31	4.101	4.163	0.062	101.51%	9.975	41.73%
32	1.914	1.923	0.009	100.46%	9.975	19.27%
41	2.413	2.446	0.033	101.39%	1.422	172.02%
42	2.666	2.717	0.051	101.90%	1.422	191.05%
51	3.251	3.458	0.207	106.36%	2.221	155.70%
52	3.237	3.283	0.046	101.41%	2.221	147.81%
61	2.726	2.839	0.113	104.14%	3.039	93.42%
62	3.670	3.751	0.081	102.20%	3.039	123.43%

The following contents may be deduced from Table 7 and Table 8.

Related inflection point values of fourth embodiment (Primary reference wavelength: 555 nm)							
HIF211	5.7875	HIF211/HOI	1.4469	SGI211	2.0360	|SGI211|/(|SGI211| + TP2)	0.4299
HIF411	2.1575	HIF411/HOI	0.5394	SGI411	0.3051	|SGI411|/(|SGI411| + TP4)	0.1766
HIF611	0.9293	HIF611/HOI	0.2323	SGI611	0.0263	|SGI611|/(|SGI611| + TP6)	0.0086
HIF621	1.1285	HIF621/HOI	0.2821	SGI621	0.0134	|SGI621|/(|SGI621| + TP6)	0.0044
HIF622	3.5566	HIF622/HOI	0.8891	SGI622	−0.3795	|SGI622|/(SGI622| + TP6)	0.1110

The Fifth Embodiment (Embodiment 5)

Please refer to FIG. **5**A, FIG. **5**B and FIG. **5**C, FIG. **5**A is a schematic view of the optical image capturing system according to the fifth embodiment of the present application, FIG. **5**B is longitudinal spherical aberration curves, astigmatic field curves, and an optical distortion curve of the optical image capturing system in the order from left to right according to the fifth embodiment of the present application, and FIG. **5**C is a lateral aberration diagram of tangential fan, sagittal fan, the longest operation wavelength and the shortest operation wavelength passing through an edge of the entrance pupil and incident on the image plane by 0.7 HOI according to the fifth embodiment of the present application. As shown in FIG. **5**A, in order from an object side to an image side, the optical image capturing system includes a first lens element **510**, a second lens element **520**, a third lens element **530**, an aperture stop **500**, a fourth lens element **540**, a fifth lens element **550**, a sixth lens element **560**, an IR-bandstop filter **580**, an image plane **590**, and an image sensing device **592**.

The first lens element **510** has negative refractive power and it is made of glass material. The first lens element **510** has a convex object-side surface **512** and a concave image-side surface **514**, and both of the object-side surface **512** and the image-side surface **514** are aspheric.

The second lens element **520** has negative refractive power and it is made of plastic material. The second lens element **520** has a convex object-side surface **522** and a concave image-side surface **524**, and both of the object-side surface **522** and the image-side surface **524** are aspheric. The object-side surface **522** has an inflection point.

The third lens element **530** has positive refractive power and it is made of glass material. The third lens element **530** has a convex object-side surface **532** and a concave image-side surface **534**, and both of the object-side surface **532** and the image-side surface **534** are aspheric.

The fourth lens element **540** has positive refractive power and it is made of plastic material. The fourth lens element **540** has a convex object-side surface **542** and a convex image-side surface **544**, and both of the object-side surface **542** and the image-side surface **544** are aspheric. The object-side surface **542** has an inflection point.

The fifth lens element **550** has negative refractive power and it is made of glass material. The fifth lens element **550** has a concave object-side surface **552** and a convex image-side surface **554**, and both of the object-side surface **552** and the image-side surface **554** are aspheric.

The sixth lens element **560** has positive refractive power and it is made of plastic material. The sixth lens element **560** has a convex object-side surface **562** and a concave image-side surface **564**. The image-side surface **564** has an inflection point. Hereby, the back focal length is reduced to miniaturize the lens element effectively. In addition, the angle of incident with incoming light from an off-axis view field can be suppressed effectively and the aberration in the off-axis view field can be corrected further.

The IR-bandstop filter **580** is made of glass material without affecting the focal length of the optical image capturing system and it is disposed between the sixth lens element **560** and the image plane **590**.

In the optical image capturing system of the fifth embodiment, a sum of focal lengths of all lens elements with positive refractive power is ΣPP. The following relation is satisfied: ΣPP=24.210 mm and f4/ΣPP=0.274. Hereby, it is favorable for allocating the positive refractive power of a single lens element to other positive lens elements and the significant aberrations generated in the process of moving the incident light can be suppressed.

In the optical image capturing system of the fifth embodiment, a sum of focal lengths of all lens elements with negative refractive power is ΣNP. The following relation is satisfied: ΣNP=−32.690 mm and f1/ΣNP=0.512. Hereby, it is favorable for allocating the negative refractive power of a single lens element to other negative lens elements.

Please refer to the following Table 9 and Table 10.

The detailed data of the optical image capturing system of the fifth embodiment is as shown in Table 9.

TABLE 9

Data of the optical image capturing system f = 2.731 mm; f/HEP = 2.0; HAF = 90.05 deg								
Surface #		Curvature Radius	Thickness	Material	Index	Abbe #	Focal length
0	Object	Plano	At infinity				
1	Lens 1	158.7125	1.948162	Glass	1.497	81.61	−16.7371
2		7.8886	2.278267				
3	Lens 2	11.97618	2.45277	Plastic	1.565	58	−8.8418
4		3.27125	7.678807				
5	Lens 3	6.83055	1.143514	Glass	1.85026	32.2	9.07105
6		52.83123	2.168908				
7	Ape. stop	Plano	0.613869				
8	Lens 4	40.58743	2.815528	Plastic	1.565	58	6.62896
9		−4.03654	0.05				
10	Lens 5	−3.52936	0.42814	Glass	2.00272	19.32	−7.11082
11		−7.34922	1.081539				
12	Lens 6	4.14836	4.775589	Plastic	1.565	58	8.51001
13		17.29949	1				
14	IR-bandstop filter	Plano	0.85	BK_7	1.517	64.13	
15		Plano	0.713831				
16	Image plane	Plano					

Reference wavelength (d-line) = 555 nm

As for the parameters of the aspheric surfaces of the fifth embodiment, reference is made to Table 10.

TABLE 10

Aspheric Coefficients

Surface #	1	2	3	4	5	6	8
k	0.000000E+00	0.000000E+00	0.927525	−0.604339	0.000000E+00	0.000000E+00	−32.086794
A4	0.000000E+00	0.000000E+00	2.13966E−04	4.54505E−05	0.000000E+00	0.000000E+00	−2.71924E−03
A6	0.000000E+00	0.000000E+00	−2.05886E−06	1.85939E−05	0.000000E+00	0.000000E+00	−3.35570E−04
A8	0.000000E+00	0.000000E+00	−5.15866E−08	−9.01497E−07	0.000000E+00	0.000000E+00	1.48631E−04
A10	0.000000E+00	0.000000E+00	−1.06716E−09	−1.67996E−07	0.000000E+00	0.000000E+00	−4.21909E−05

Surface #	9	10	11	12	13
k	0.900289	0.000000E+00	0.000000E+00	−5.698577	7.307759
A4	−1.01800E−02	0.000000E+00	0.000000E+00	1.13955E−03	8.80338E−04
A6	1.40865E−03	0.000000E+00	0.000000E+00	−2.52170E−05	−4.77208E−05
A8	−1.21578E−04	0.000000E+00	0.000000E+00	1.81875E−06	−2.00898E−06
A10	6.56126E−06	0.000000E+00	0.000000E+00	−3.27995E−08	7.62651E−08

The presentation of the aspheric surface formula in the fifth embodiment is similar to that in the first embodiment. Besides the definitions of parameters in following tables are equal to those in the first embodiment so the repetitious details will not be given here.

The following contents may be deduced from Table 9 and Table 10.

Fifth embodiment (Primary reference wavelength: 587.5 nm)					
|f/f1|	|f/f2|	|f/f3|	|f/f4|	|f/f5|	|f/f6|
0.16317	0.30886	0.30106	0.41197	0.38405	0.32091

-continued

Fifth embodiment (Primary reference wavelength: 587.5 nm)					
Σ PPR	Σ NPR	Σ PPR/|Σ NPR|	IN12/f	IN56/f	TP4/(IN34 + TP4 + IN45)
1.03393	0.85608	1.20775	0.83425	0.39604	0.49847
|f1/f2|	|f2/f3|	(TP1 + IN12)/TP2		(TP6 + IN56)/TP5	
1.89295	0.97473	1.72313		13.68041	
HOS	InTL	HOS/HOI	InS/HOS	ODT %	TDT %
29.99890	27.43510	7.49973	0.41097	−100.15900	84.30610

-continued

Fifth embodiment (Primary reference wavelength: 587.5 nm)					
HVT51	HVT52	HVT61	HVT62	HVT62/HOI	HVT62/HOS
0	0	0.00000	0.00000	0.00000	0.00000
TP2/TP3	TP3/TP4	InRS61	InRS62	|InRS61|/TP6	|InRS62|/TP6
2.14495	0.40614	0.95926	0.40349	0.20087	0.08449
PSTA	PLTA	NSTA	NLTA	SSTA	SLTA
−0.024 mm	0.006 mm	0.015 mm	0.010 mm	−0.003 mm	0.005 mm

The numerical related to the length of outline curve is shown according to table 9 and table 10.

Fifth embodiment (Reference wavelength = 555 nm)						
ARE	½(HEP)	ARE value	ARE − ½(HEP)	2(ARE/HEP) %	TP	ARE/TP (%)
11	0.683	0.682	−0.00072	99.89%	1.948	35.01%
12	0.683	0.683	0.00013	100.02%	1.948	35.05%
21	0.683	0.682	−0.00036	99.95%	2.453	27.82%
22	0.683	0.687	0.00423	100.62%	2.453	28.01%
31	0.683	0.683	0.00041	100.06%	1.144	59.74%
32	0.683	0.682	−0.00071	99.90%	1.144	59.64%
41	0.683	0.682	−0.00070	99.90%	2.816	24.22%
42	0.683	0.686	0.00290	100.42%	2.816	24.35%
51	0.683	0.686	0.00359	100.53%	0.428	160.30%
52	0.683	0.683	0.00026	100.04%	0.428	159.52%
61	0.683	0.685	0.00215	100.31%	4.776	14.34%
62	0.683	0.682	−0.00054	99.92%	4.776	14.28%
ARS	EHD	ARS value	ARS − EHD	(ARS/EHD) %	TP	ARS/TP (%)
11	12.862	12.876	0.014	100.11%	1.948	660.94%
12	7.043	8.703	1.660	123.57%	1.948	446.74%
21	6.920	7.371	0.451	106.52%	2.453	300.50%
22	4.637	6.247	1.611	134.74%	2.453	254.71%
31	3.450	3.615	0.166	104.80%	1.144	316.17%
32	3.326	3.328	0.002	100.05%	1.144	291.05%
41	2.011	2.012	0.001	100.04%	2.816	71.45%
42	2.600	3.056	0.455	117.50%	2.816	108.52%
51	2.556	2.858	0.302	111.82%	0.428	667.63%
52	2.933	3.016	0.083	102.84%	0.428	704.43%
61	4.210	4.565	0.356	108.45%	4.776	95.60%
62	3.928	3.968	0.040	101.02%	4.776	83.10%

The following contents may be deduced from Table 9 and Table 10.

Related inflection point values of fifth embodiment (Primary reference wavelength: 555 nm)							
HIF211	5.7489	HIF211/HOI	1.4372	SGI211	1.6367	|SGI211|/(|SGI211| + TP2)	0.4002
HIF411	0.8115	HIF411/HOI	0.2029	SGI411	0.0068	|SGI411|/(|SGI411| + TP4)	0.0024
HIF621	3.2659	HIF621/HOI	0.8165	SGI621	0.3620	|SGI621|/(|SGI621| + TP6)	0.0705

The Sixth Embodiment (Embodiment 6)

Please refer to FIG. **6**A, FIG. **6**B and FIG. **6**C, FIG. **6**A is a schematic view of the optical image capturing system according to the sixth Embodiment of the present application, FIG. **6**B is longitudinal spherical aberration curves, astigmatic field curves, and an optical distortion curve of the optical image capturing system in the order from left to right according to the sixth Embodiment of the present application, and FIG. **6**C is a lateral aberration diagram of tangential fan, sagittal fan, the longest operation wavelength and the shortest operation wavelength passing through an edge of the entrance pupil and incident on the image plane by 0.7 HOI according to the sixth embodiment of the present application. As shown in FIG. **6**A, in order from an object side to an image side, the optical image capturing system includes a first lens element **610**, a second lens element **620**, a third lens element **630**, an aperture stop **600**, a fourth lens element **640**, a fifth lens element **650**, a sixth lens element **660**, an IR-bandstop filter **680**, an image plane **690**, and an image sensing device **692**.

The first lens element **610** has negative refractive power and it is made of glass material. The first lens element **610** has a convex object-side surface **612** and a concave image-side surface **614**, and both of the object-side surface **612** and the image-side surface **614** are aspheric.

The second lens element **620** has negative refractive power and it is made of plastic material. The second lens element **620** has a convex object-side surface **622** and a concave image-side surface **624**, and both of the object-side surface **622** and the image-side surface **624** are aspheric and have an inflection point.

The third lens element **630** has positive refractive power and it is made of glass material. The third lens element **630** has a convex object-side surface **632** and a concave image-side surface **634**, and both of the object-side surface **632** and the image-side surface **634** are aspheric.

The fourth lens element **640** has positive refractive power and it is made of plastic material. The fourth lens element **640** has a convex object-side surface **642** and a convex image-side surface **644**, and both of the object-side surface **642** and the image-side surface **644** are aspheric. The object-side surface **642** has an inflection point.

The fifth lens element **650** has positive refractive power and it is made of glass material. The fifth lens element **650** has a convex object-side surface **652** and a convex image-side surface **654**, and both of the object-side surface **652** and the image-side surface **654** are aspheric.

The sixth lens element **660** has positive refractive power and it is made of plastic material. The sixth lens element **660** has a concave object-side surface **662** and a convex image-side surface **664**. Hereby, the back focal length is reduced to miniaturize the lens element effectively. In addition, the angle of incident with incoming light from an off-axis view field can be suppressed effectively and the aberration in the off-axis view field can be corrected further.

The IR-bandstop filter **680** is made of plastic material without affecting the focal length of the optical image capturing system and it is disposed between the sixth lens element **660** and the image plane **690**.

In the optical image capturing system of the sixth embodiment, a sum of focal lengths of all lens elements with positive refractive power is ΣPP. The following relations are satisfied: ΣPP=66.900 mm and f4/ΣPP=0.089. Hereby, it is favorable for allocating the positive refractive power of a single lens element to other positive lens elements and the significant aberrations generated in the process of moving the incident light can be suppressed.

In the optical image capturing system of the sixth embodiment, a sum of focal lengths of all lens elements with negative refractive power is ΣNP. The following relations are satisfied: ΣNP=−28.0278 mm and f1/ΣNP=0.787. Hereby, it is favorable for allocating the negative refractive power of a single lens element to other negative lens elements.

Please refer to the following Table 11 and Table 12.

The detailed data of the optical image capturing system of the sixth Embodiment is as shown in Table 11.

TABLE 11

Data of the optical image capturing system
f = 2.444 mm; f/HEP = 2.0; HAF = 70.000 deg

Surface #	Curvature Radius		Thickness	Material	Index	Abbe #	Focal length
0	Object	Plano	At infinity				
1	Lens 1	64.73725	1.769099	Glass	1.497	81.61	−22.0634
2		9.30979	1.213527				
3	Lens 2	11.28133	2.000545	Plastic	1.565	58	−5.98497
4		2.44067	3.539669				
5	Lens 3	8.99034	8.952897	Glass	2.00272	19.32	39.015
6		5.81026	0.853199				
7	Ape. stop	Plano	0.05				
8	Lens 4	7.48448	2.086861	Plastic	1.565	58	5.98404
9		−5.57661	0.412171				
10	Lens 5	5.29685	1.962138	Glass	1.497	81.61	7.76287
11		−12.5586	2.295313				
12	Lens 6	−45.7341	3.48915	Plastic	1.65	21.4	14.1376
13		−7.93795	0.5				
14	IR-bandstop filter	Plano	0.85	BK_7	1.517	64.13	
15		Plano	0.025399				
16	Image plane	Plano					

Reference wavelength (d-line) = 555 nm

As for the parameters of the aspheric surfaces of the sixth Embodiment, reference is made to Table 12.

TABLE 12

Aspheric Coefficients

	Surface # 3	4	5	6	8	9	10
k	−0.878141	−0.744684	0.000000E+00	0.000000E+00	11.901861	−1.175121	0.000000E+00
A4	4.60534E−04	8.63870E−04	0.000000E+00	0.000000E+00	−6.39244E−03	−2.06820E−03	0.000000E+00
A6	−7.14692E−06	−1.14380E−05	0.000000E+00	0.000000E+00	−6.53140E−04	−1.82876E−04	0.000000E+00
A8	−7.24993E−08	2.81209E−06	0.000000E+00	0.000000E+00	−1.88084E−05	6.72122E−06	0.000000E+00
A10	4.04555E−10	−5.15683E−07	0.000000E+00	0.000000E+00	−4.19272E−05	−4.91052E−06	0.000000E+00

	Surface # 11	12	13
k	0.000000E+00	50	−15.401579
A4	0.000000E+00	−6.20415E−03	−5.73797E−04
A6	0.000000E+00	−4.61478E−04	−8.18676E−05

TABLE 12-continued

Aspheric Coefficients			
A8	0.000000E+00	3.45645E−06	−4.06629E−07
A10	0.000000E+00	−4.32860E−06	5.29741E−08

In the sixth Embodiment, the presentation of the aspheric surface formula is similar to that in the first embodiment. Besides, the definitions of parameters in following tables are equal to those in the first embodiment, so the repetitious details will not be given here.

The following contents may be deduced from Table 11 and Table 12.

Sixth Embodiment (Primary reference wavelength: 555 nm)					
|f/f1|	|f/f2|	|f/f3|	|f/f4|	|f/f5|	|f/f6|
0.11077	0.40835	0.06264	0.40841	0.31483	0.17287
Σ PPR	Σ NPR	Σ PPR/|Σ NPR|	IN12/f	IN56/f	TP4/(IN34 + TP4 + IN45)
1.10679	0.51912	2.13204	0.49654	0.93917	0.61338
|f1/f2|	|f2/f3|	(TP1 + IN12)/TP2		(TP6 + IN56)/TP5	
3.68647	0.15340	1.49091		2.94804	

-continued

Sixth Embodiment (Primary reference wavelength: 555 nm)					
HOS	InTL	HOS/HOI	InS/HOS	ODT %	TDT %
29.99990	28.62460	7.49998	0.38903	−40.39990	38.32870
HVT51	HVT52	HVT61	HVT62	HVT62/HOI	HVT62/HOS
0	0	0.00000	0.00000	0.00000	0.00000
TP2/TP3	TP3/TP4	InRS61	InRS62	|InRS61|/TP6	|InRS62|/TP6
0.22345	4.29013	−0.62941	−0.89702	0.18039	0.25709
PSTA	PLTA	NSTA	NLTA	SSTA	SLTA
−0.023 mm	0.007 mm	−0.009 mm	0.005 nm	0.002 mm	0.006 mm

The numerical related to the length of outline curve is shown according to table 11 and table 12.

Sixth embodiment (Reference wavelength = 555 nm)						
ARE	½(HEP)	ARE value	ARE − ½(HEP)	2(ARE/HEP) %	TP	ARE/TP (%)
11	0.611	0.610	−0.00098	99.84%	1.769	34.48%
12	0.611	0.610	−0.00056	99.91%	1.769	34.51%
21	0.611	0.610	−0.00069	99.89%	2.001	30.51%
22	0.611	0.616	0.00538	100.88%	2.001	30.81%
31	0.611	0.610	−0.00052	99.91%	8.953	6.82%
32	0.611	0.611	0.00013	100.02%	8.953	6.83%
41	0.611	0.611	−0.00034	99.94%	2.087	29.26%
42	0.611	0.611	0.00025	100.04%	2.087	29.29%
51	0.611	0.611	0.00036	100.06%	1.962	31.16%
52	0.611	0.610	−0.00075	99.88%	1.962	31.16%
61	0.611	0.610	−0.00096	99.84%	3.489	17.48%
62	0.611	0.611	−0.00042	99.93%	3.489	17.50%
ARS	EHD	ARS value	ARS − EHD	(ARS/EHD) %	TP	ARS/TP (%)
11	11.074	11.128	0.054	100.49%	1.769	629.00%
12	7.026	7.960	0.934	113.30%	1.769	449.95%
21	6.890	7.294	0.404	105.86%	2.001	364.60%
22	4.164	6.363	2.200	152.83%	2.001	318.08%
31	4.140	4.301	0.162	103.90%	8.953	48.04%
32	1.592	1.612	0.020	101.26%	8.953	18.00%
41	1.650	1.658	0.009	100.54%	2.087	79.47%
42	2.274	2.367	0.093	104.11%	2.087	113.44%
51	2.952	3.131	0.179	106.06%	1.962	159.58%
52	2.937	2.963	0.027	100.91%	1.962	151.03%
61	2.618	2.758	0.140	105.36%	3.489	79.05%
62	3.697	3.843	0.145	103.93%	3.489	110.14%

The following contents may be deduced from Table 11 and Table 12.

Related inflection point values of sixth embodiment (Primary reference wavelength: 555 nm)							
HIF211	5.3794	HIF211/HOI	1.3448	SGI211	1.4614	|SGI211|/(|SGI211| + TP2)	0.4221
HIF221	4.0056	HIF221/HOI	1.0014	SGI221	4.0303	|SGI221|/(|SGI221| + TP2)	0.6683

The Seventh Embodiment (Embodiment 7)

Please refer to FIG. 7A, FIG. 7B and FIG. 7C, FIG. 7A is a schematic view of the optical image capturing system according to the seventh Embodiment of the present application, FIG. 7B is longitudinal spherical aberration curves, astigmatic field curves, and an optical distortion curve of the optical image capturing system in the order from left to right according to the seventh Embodiment of the present application, and FIG. 7C is a lateral aberration diagram of tangential fan, sagittal fan, the longest operation wavelength and the shortest operation wavelength passing through an edge of the entrance pupil and incident on the image plane by 0.7 HOI according to the seventh embodiment of the present application. As shown in FIG. 7A, in order from an object side to an image side, the optical image capturing system includes a first lens element **710**, a second lens element **720**, an aperture stop **700**, a third lens element **730**, a fourth lens element **740**, a fifth lens element **750**, a sixth lens element **760**, an IR-bandstop filter **780**, an image plane **790**, and an image sensing device **792**.

The first lens element **710** has negative refractive power and it is made of glass material. The first lens element **710** has a convex object-side surface **712** and a concave image-side surface **714**, and both of the object-side surface **712** and the image-side surface **714** are aspheric.

The second lens element **720** has positive refractive power and it is made of plastic material. The second lens element **720** has a convex object-side surface **722** and a concave image-side surface **724**, and both of the object-side surface **722** and the image-side surface **724** are aspheric.

The third lens element **730** has positive refractive power and it is made of glass material. The third lens element **730** has a convex object-side surface **732** and a convex image-side surface **734**, and both of the object-side surface **732** and the image-side surface **734** are aspheric.

The fourth lens element **740** has negative refractive power and it is made of plastic material. The fourth lens element **740** has as concave object-side surface **742** and a convex image-side surface **744**, and both of the object-side surface **742** and the image-side surface **744** are aspheric. The object-side surface **742** has an inflection point.

The fifth lens element **750** has positive refractive power and it is made of plastic material. The fifth lens element **750** has a concave object-side surface **752** and a convex image-side surface **754**, and both of the object-side surface **752** and the image-side surface **754** are aspheric. The image-side surface **754** has an inflection point.

The sixth lens element **760** has positive refractive power and it is made of plastic material. The sixth lens element **760** has a concave object-side surface **762** and a convex image-side surface **764**. Hereby, the back focal length is reduced to miniaturize the lens element effectively. In addition, the angle of incident with incoming light from an off-axis view field can be suppressed effectively and the aberration in the off-axis view field can be corrected further.

The IR-bandstop filter **780** is made of glass material without affecting the focal length of the optical image capturing system and it is disposed between the sixth lens element **760** and the image plane **790**.

In the optical image capturing system of the seventh embodiment, a sum of focal lengths of all lens elements with positive refractive power is ΣPP. The following relations are satisfied: ΣPP=66.333 mm and f2/ΣPP=0.540. Hereby, it is favorable for allocating the positive refractive power of a single lens element to other positive lens elements and the significant aberrations generated in the process of moving the incident light can be suppressed.

In the optical image capturing system of the seventh embodiment, a sum of focal lengths of all lens elements with negative refractive power is ΣNP. The following relations are satisfied: ΣNP=−7.968 mm and f1/ΣNP=0.627. Hereby, it is favorable for allocating the negative refractive power of a single lens element to other negative lens elements.

Please refer to the following Table 13 and Table 14.

The detailed data of the optical image capturing system of the seventh Embodiment is as shown in Table 13.

TABLE 13

Data of the optical image capturing system
f = 3.734 mm; f/HEP = 2.8; HAF = 60.000 deg

Surface #		Curvature Radius	Thickness	Material	Index	Abbe #	Focal length
0	Object	Plano	At infinity				
1	Lens 1	25.83945	0.57735	Glass	1.56384	60.7	−4.99728
2		2.52696	1.482023				
3	Lens 2	9.12695	3.276371	Plastic	1.65	21.4	35.7892
4		12.81628	0.049817				
5	Ape. stop	Plano	0.4				
6	Lens 3	13.78383	1.259894	Glass	2.001	29.13	3.06725
7		−3.79913	0.166918				
8	Lens 4	−3.45617	0.3	Plastic	1.65	21.4	−2.97038
9		4.61165	0.107861				
10	Lens 5	6.40049	1.72256	Plastic	1.565	58	4.6518
11		−4.0469	0.05				
12	Lens 6	−10.8812	0.646965	Glass	1.497	81.61	22.8248
13		−5.66991	0.7				
14	IR-bandstop filter	Plano	0.85	BK_7	1.517	64.13	
15		Plano	4.410239				
16	Image plane	Plano					

Reference wavelength (d-line) = 555 nm

As for the parameters of the aspheric surfaces of the seventh Embodiment, reference is made to Table 14.

TABLE 14

Aspheric Coefficients							
	Surface #						
	3	4	6	7	8	9	10
k	5.421186	34.081963	0.000000E+00	0.000000E+00	−0.130464	−2.829009	−1.354227
A4	7.44705E−04	7.24190E−03	0.000000E+00	0.000000E+00	−2.18182E−05	−1.61987E−03	−6.88071E−04
A6	1.31143E−04	−2.40196E−03	0.000000E+00	0.000000E+00	2.84075E−04	−4.35256E−05	3.20238E−04
A8	−7.41900E−06	2.98968E−03	0.000000E+00	0.000000E+00	1.65500E−04	3.73337E−05	5.74429E−06
A10	1.61914E−06	−1.06068E−03	0.000000E+00	0.000000E+00	6.05544E−06	−2.34181E−06	8.38341E−07

	Surface #		
	11	12	13
k	−0.7875	0.000000E+00	0.000000E+00
A4	9.61923E−04	0.000000E+00	0.000000E+00
A6	3.06516E−04	0.000000E+00	0.000000E+00
A8	−4.07384E−06	0.000000E+00	0.000000E+00
A10	1.36567E−05	0.000000E+00	0.000000E+00

In the seventh Embodiment, the presentation of the aspheric surface formula is similar to that in the first embodiment. Besides, the definitions of parameters in following tables are equal to those in the first embodiment, so the repetitious details will not be given here.

The following contents may be deduced from Table 13 and Table 14.

Seventh Embodiment (Primary reference wavelength: 555 nm)					
|f/f1|	|f/f2|	|f/f3|	|f/f4|	|f/f5|	|f/f6|
0.74714	0.10432	1.21727	1.25697	0.80263	0.16358
Σ PPR	Σ NPR	Σ PPR/|Σ NPR|	IN12/f	IN56/f	TP4/(IN34 + TP4 + IN45)
2.28780	2.00411	1.14156	0.39693	0.01339	0.52194
|f1/f2|	|f2/f3|	(TP1 + IN12)/TP2		(TP6 + IN56)/TP5	
0.13963	11.66817	0.62855		0.40461	

-continued

Seventh Embodiment (Primary reference wavelength: 555 nm)					
HOS	InTL	HOS/HOI	InS/HOS	ODT %	TDT %
16.00000	10.03980	4.00000	0.66341	−38.1161	25.1423
HVT51	HVT52	HVT61	HVT62	HVT62/HOI	HVT62/HOS
0	0	0.00000	0.00000	0.00000	0.00000
TP2/TP3	TP3/TP4	InRS61	InRS62	|InRS61|/TP6	|InRS62|/TP6
2.60052	4.19963	−0.29936	−0.64630	0.46271	0.99898
PSTA	PLTA	NSTA	NLTA	SSTA	SLTA
0.00033 mm	0.005 mm	0.007 mm	0.001 mm	0.004 mm	−0.001 mm

The numerical related to the length of outline curve is shown according to table 13 and table 14.

Seventh embodiment (Reference wavelength = 555 nm)						
ARE	½(HEP)	ARE value	ARE − ½(HEP)	2(ARE/HEP) %	TP	ARE/TP (%)
11	0.667	0.666	−0.00065	99.90%	0.577	115.37%
12	0.667	0.674	0.00724	101.09%	0.577	116.73%
21	0.667	0.667	−0.00011	99.98%	3.276	20.35%
22	0.667	0.666	−0.00035	99.95%	3.276	20.34%
31	0.667	0.666	−0.00047	99.93%	1.260	52.88%
32	0.667	0.669	0.00273	100.41%	1.260	53.14%
41	0.667	0.670	0.00345	100.52%	0.300	223.39%
42	0.667	0.668	0.00149	100.22%	0.300	222.74%
51	0.667	0.667	0.00046	100.07%	1.723	38.73%
52	0.667	0.669	0.00225	100.34%	1.723	38.84%
61	0.667	0.666	−0.00031	99.95%	0.647	103.01%
62	0.667	0.668	0.00081	100.12%	0.647	103.18%
ARS	EHD	ARS value	ARS − EHD	(ARS/EHD) %	TP	ARS/TP (%)
11	3.659	3.671	0.012	100.33%	0.577	635.90%
12	2.278	2.836	0.558	124.51%	0.577	491.19%
21	2.141	2.173	0.031	101.46%	3.276	66.31%
22	1.014	1.016	0.001	100.13%	3.276	31.00%

-continued

Seventh embodiment (Reference wavelength = 555 nm)						
31	1.600	1.604	0.004	100.22%	1.260	127.28%
32	1.826	1.904	0.078	104.26%	1.260	151.10%
41	1.843	1.925	0.082	104.45%	0.300	641.52%
42	2.148	2.202	0.054	102.50%	0.300	733.96%
51	2.257	2.312	0.055	102.43%	1.723	134.21%
52	2.427	2.504	0.077	103.16%	1.723	145.38%
61	2.535	2.557	0.023	100.90%	0.647	395.30%
62	2.629	2.733	0.104	103.94%	0.647	422.37%

The following contents may be deduced from Table 13 and Table 14.

Related inflection point values of seventh embodiment (Primary reference wavelength: 555 nm)							
HIF411	1.7754	HIF411/HOI	0.4438	SGI411	−0.4588	|SGI411|/(|SGI411| + TP4)	0.6046
HIF521	1.8025	HIF521/HOI	0.4506	SGI521	−0.3806	|SGI521|/(|SGI521| + TP5)	0.1810

The Eighth Embodiment (Embodiment 8)

Please refer to FIG. **8**A, FIG. **8**B and FIG. **8**C, FIG. **8**A is a schematic view of the optical image capturing system according to the eighth Embodiment of the present application, FIG. **8**B is longitudinal spherical aberration curves, astigmatic field curves, and an optical distortion curve of the optical image capturing system in the order from left to right according to the eighth Embodiment of the present application, and FIG. **8**C is a lateral aberration diagram of tangential fan, sagittal fan, the longest operation wavelength and the shortest operation wavelength passing through an edge of the entrance pupil and incident on the image plane by 0.7 HOI according to the eighth embodiment of the present application. As shown in FIG. **8**A, in order from an object side to an image side, the optical image capturing system includes an aperture stop **800**, a first lens element **810**, a second lens element **820**, a third lens element **830**, a fourth lens element **840**, a fifth lens element **850**, a sixth lens element **860**, an IR-bandstop filter **880**, an image plane **890**, and an image sensing device **892**.

The first lens element **810** has positive refractive power and it is made of plastic material. The first lens element **810** has a convex object-side surface **812** and a concave image-side surface **814**, both of the object-side surface **812** and the image-side surface **814** are aspheric, and the image-side surface **814** has an inflection point.

The second lens element **820** has negative refractive power and it is made of plastic material. The second lens element **820** has a concave object-side surface **822** and a concave image-side surface **824**, and both of the object-side surface **822** and the image-side surface **824** are aspheric. The image-side surface **824** has two inflection points.

The third lens element **830** has negative refractive power and it is made of plastic material. The third lens element **830** has a convex object-side surface **832** and a concave image-side surface **834**, and both of the object-side surface **832** and the image-side surface **834** are aspheric. The object-side surface **832** and the image-side surface **834** both have an inflection point.

The fourth lens element **840** has positive refractive power and it is made of plastic material. The fourth lens element **840** has a concave object-side surface **842** and a convex image-side surface **844**, and both of the object-side surface **842** and the image-side surface **844** are aspheric. The object-side surface **842** has three inflection points.

The fifth lens element **850** has positive refractive power and it is made of plastic material. The fifth lens element **850** has a convex object-side surface **852** and a convex image-side surface **854**, and both of the object-side surface **852** and the image-side surface **854** are aspheric. The object-side surface **852** has three inflection points and the image-side surface **854** has an inflection point.

The sixth lens element **860** has negative refractive power and it is made of plastic material. The sixth lens element **860** has a concave object-side surface **862** and a concave image-side surface **864**. The object-side surface **862** has two infection points and the image-side surface **864** has an inflection point. Hereby, the back focal length is reduced to miniaturize the lens element effectively. In addition, the angle of incident with incoming light from an off-axis view field can be suppressed effectively and the aberration in the off-axis view field can be corrected further.

The IR-bandstop filter **880** is made of glass material without affecting the focal length of the optical image capturing system and it is disposed between the sixth lens element **860** and the image plane **890**.

In the optical image capturing system of the eighth embodiment, a sum of focal lengths of all lens elements with positive refractive power is ΣPP. The following relations are satisfied: ΣPP=12.785 mm and f5/ΣPP=0.10. Hereby, it is favorable for allocating the positive refractive power of a single lens element to other positive lens elements and the significant aberrations generated in the process of moving the incident light can be suppressed.

In the optical image capturing system of the sixth embodiment, a sum of focal lengths of all lens elements with negative refractive power is ΣNP. The following relations are satisfied: ΣNP=−112.117 mm and f6/ΣNP=0.009. Hereby, it is favorable for allocating the negative refractive power of a single lens element to other negative lens elements.

Please refer to the following Table 15 and Table 16.

The detailed data of the optical image capturing system of the eighth Embodiment is as shown in Table 15.

TABLE 15

Data of the optical image capturing system f = 3.213 mm; f/HEP = 2.4; HAF = 50.015 deg							
Surface #		Curvature Radius	Thickness	Material	Index	Abbe #	Focal length
0	Object	Plano	At infinity				
1	Shading sheet	Plano	0.000				
	Ape. stop	Plano	−0.108				
3	Lens 1	2.117380565	0.267	Plastic	1.565	58.00	6.003
4		5.351202213	0.632				
5	Lens 2	−70.37596785	0.230	Plastic	1.517	21.40	−11.326
6		8.30936549	0.050				
7	Lens 3	7.333171865	0.705	Plastic	1.565	58.00	−99.749
8		6.265499794	0.180				
9	Lens 4	−71.32533363	0.832	Plastic	1.565	58.00	5.508
10		−3.003657909	0.050				
11	Lens 5	3.397431079	0.688	Plastic	1.583	30.20	1.274
12		−0.886432266	0.050				
13	Lens 6	−3.715425702	0.342	Plastic	1.650	21.40	−1.042
14		0.867623637	0.700				
15	IR-bandstop filter	Plano	0.200		1.517	64.13	
16		Plano	0.407				
17	Image plane	Plano					

Reference wavelength (d-line) = 555 nm, shield position: clear aperture (CA) of the first plano = 0.640 mm

As for the parameters of the aspheric surfaces of the eighth Embodiment, reference is made to Table 16.

TABLE 16

Aspheric Coefficients							
	Surface #						
	3	4	5	6	7	8	9
k	−1.486403E+00	2.003790E+01	−4.783682E+01	−2.902431E+01	−5.000000E+01	−5.000000E+01	−5.000000E+01
A4	2.043654E−02	−2.642626E−02	−6.237485E−02	−4.896336E−02	−7.363667E−02	−5.443257E−02	3.105497E−02
A6	−2.231403E−04	−4.147746E−02	−8.137705E−02	−1.981368E−02	1.494245E−02	1.263891E−04	−1.532514E−02
A8	−1.387235E−02	2.901026E−02	4.589961E−02	3.312952E−03	6.252296E−03	−9.655324E−03	−6.443603E−04
A10	−3.431740E−02	−9.512960E−02	−5.485574E−02	5.634445E−03	−2.226544E−03	1.318692E−03	4.321089E−04
A12	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
A14	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00

	Surface #				
	10	11	12	13	14
k	8.520005E−01	−5.000000E+01	−4.524978E+00	−5.000000E+01	−4.286435E+00
A4	−6.786287E−03	−9.520247E−02	−4.666187E−02	5.856863E−03	−2.635938E−02
A6	6.693976E−03	−5.507560E−05	3.849227E−03	2.442214E−03	3.694093E−03
A8	8.220809E−04	1.932773E−03	1.041053E−03	−2.201034E−03	−1.355873E−04
A10	−2.798394E−04	3.346274E−04	4.713339E−06	−1.065215E−04	−5.321575E−05
A12	0.000000E+00	1.125736E−05	−2.834871E−06	1.227641E−04	6.838440E−06
A14	0.000000E+00	−1.671951E−05	−2.293810E−06	−1.181115E−05	−2.530792E−07

In the eighth Embodiment, the presentation of the aspheric surface formula is similar to that in the first embodiment. Besides, the definitions of parameters in following tables are equal to those in the first embodiment, so the repetitious details will not be given here.

The following contents may be deduced from Table 15 and Table 16.

Eighth Embodiment (Primary reference wavelength: 555 nm)					
|f/f1|	|f/f2|	|f/f3|	|f/f4|	|f/f5|	|f/f6|
0.53529	0.28371	0.03221	0.58335	2.52139	3.08263

-continued

Eighth Embodiment (Primary reference wavelength: 555 nm)					
Σ PPR	Σ NPR	Σ PPR/|Σ NPR|	IN12/f	IN56/f	TP4/(IN34 + TP4 + IN45)
6.72266	0.84594	7.94700	0.19680	0.01556	0.78362
|f1/f2|	|f2/f3|	(TP1 + IN12)/TP2		(TP6 + IN56)/TP5	
0.53001	0.11354	3.90947		0.56888	

-continued

Eighth Embodiment (Primary reference wavelength: 555 nm)					
HOS	InTL	HOS/HOI	InS/HOS	ODT %	TDT %
5.33002	4.02576	1.36178	0.97981	1.92371	1.09084
HVT51	HVT52	HVT61	HVT62	HVT62/HOI	HVT62/HOS
0.67483	0	0.00000	2.23965	0.57222	0.42020

-continued

Eighth Embodiment (Primary reference wavelength: 555 nm)					
TP2/TP3	TP3/TP4	InRS61	InRS62	|InRS61|/TP6	|InRS62|/TP6
0.32631	0.84713	−0.74088	−0.06065	2.16896	0.17755
PLTA	PSTA	NLTA	NSTA	SLTA	SSTA
0.005 mm	−0.003 mm	0.010	0.006 mm	0.004 mm	0.003 mm

The numerical related to the length of outline curve is shown according to table 15 and table 16.

Eighth embodiment (Primary reference wavelength = 555 nm)						
ARE	½(HEP)	ARE value	ARE − ½(HEP)	2(ARE/HEP) %	TP	ARE/TP (%)
11	0.648	0.658	0.01023	101.58%	0.267	246.73%
12	0.670	0.670	0.00041	100.06%	0.267	251.19%
21	0.670	0.670	0.00002	100.00%	0.230	291.24%
22	0.670	0.669	−0.00064	99.90%	0.230	290.95%
31	0.670	0.669	−0.00063	99.91%	0.705	94.94%
32	0.670	0.669	−0.00046	99.93%	0.705	94.97%
41	0.670	0.669	−0.00082	99.88%	0.832	80.40%
42	0.670	0.675	0.00511	100.76%	0.832	81.12%
51	0.670	0.670	−0.00003	100.00%	0.688	97.31%
52	0.670	0.702	0.03243	104.84%	0.688	102.02%
61	0.670	0.671	0.00099	100.15%	0.342	196.39%
62	0.670	0.699	0.02890	104.31%	0.342	204.56%
ARS	EHD	ARS value	ARS − EHD	(ARS/EHD) %	TP	ARS/TP (%)
11	0.648	0.658	0.01023	101.58%	0.267	246.73%
12	0.697	0.697	0.00042	100.06%	0.267	261.33%
21	0.994	1.026	0.03192	103.21%	0.230	446.16%
22	1.255	1.259	0.00315	100.25%	0.230	547.21%
31	1.383	1.385	0.00192	100.14%	0.705	196.48%
32	1.604	1.816	0.21279	113.27%	0.705	257.68%
41	1.876	1.908	0.03181	101.70%	0.832	229.32%
42	2.027	2.193	0.16648	108.21%	0.832	263.61%
51	2.038	2.282	0.24376	111.96%	0.688	331.49%
52	2.144	2.485	0.34081	115.89%	0.688	361.03%
61	2.411	2.624	0.21261	108.82%	0.342	768.18%
62	3.309	3.686	0.37664	111.38%	0.342	1078.99%

The following contents may be deduced from Table 15 and Table 16.

Related inflection point values of eighth Embodiment (Primary reference wavelength: 555 nm)							
HIF121	0.57452	HIF121/HOI	0.14679	SGI121	0.02858	|SGI121|/(|SGI121| + TP1)	0.09675
HIF221	0.40206	HIF221/HOI	0.10272	SGI221	0.00821	|SGI221|/(|SGI221| + TP2)	0.03448
HIF222	1.11769	HIF222/HOI	0.28556	SGI222	−0.02234	|SGI222|/(|SGI222| + TP2)	0.08853
HIF311	0.37391	HIF311/HOI	0.09553	SGI311	0.00785	|SGI311|/(|SGI311| + TP3)	0.01102
HIF321	0.42061	HIF321/HOI	0.10746	SGI321	0.01170	|SGI321|/(|SGI321| + TP3)	0.01633
HIF411	0.19878	HIF411/HOI	0.05079	SGI411	−0.00023	|SGI411|/(|SGI411| + TP4)	0.00028
HIF412	0.87349	HIF412/HOI	0.22317	SGI412	0.00583	|SGI412|/(|SGI412| + TP4)	0.00695
HIF413	1.87638	HIF413/HOI	0.47940	SGI413	−0.17360	|SGI413|/(|SGI413| + TP4)	0.17263
HIF511	0.36373	HIF511/HOI	0.09293	SGI511	0.015644	|SGI511|/(|SGI511| + TP5)	0.02222
HIF512	1.7159	HIF512/HOI	0.43840	SGI512	−0.446747	|SGI512|/(|SGI512| + TP5)	0.39358
HIF513	1.93653	HIF513/HOI	0.49477	SGI513	−0.638544	|SGI513|/(|SGI513| + TP5)	0.48124
HIF521	1.54767	HIF521/HOI	0.39542	SGI521	−0.792114	|SGI521|/(|SGI521| + TP5)	0.53505
HIF611	0.82168	HIF611/HOI	0.20993	SGI611	−0.060958	|SGI611|/(|SGI611| + TP6)	0.15143
HIF612	0.98146	HIF612/HOI	0.25076	SGI612	−0.07785	|SGI612|/(|SGI612| + TP6)	0.18561
HIF621	0.79476	HIF621/HOI	0.20306	SGI621	0.238143	|SGI621|/(|SGI621| + TP6)	0.41079

The above-mentioned descriptions represent merely the exemplary embodiment of the present disclosure, without any intention to limit the scope of the present disclosure thereto. Various equivalent changes, alternations or modifications based on the claims of present disclosure are all consequently viewed as being embraced by the scope of the present disclosure.

What is claimed is:

1. An optical image capturing system, from an object side to an image side, comprising:

a first lens element with refractive power;

a second lens element with refractive power;

a third lens element with refractive power

a fourth lens element with refractive power;

a fifth lens element with refractive power;

a sixth lens element with refractive power; and

an image plane;

wherein the optical image capturing system consists of the six lens elements with refractive power, a maximum height for image formation on the image plane perpendicular to the optical axis in the optical image capturing system is denoted by HOI, at least one of the first through sixth lens elements has positive refractive power, a focal length of the optical image capturing system is f, an entrance pupil diameter of the optical image capturing system is HEP, a distance on an optical axis from an object-side surface of the first lens element to the image plane is HOS, a distance on an optical axis from the object-side surface of the first lens element to the image-side surface of the sixth lens element is InTL, a length of outline curve from an axial point on any surface of any one of the six lens elements to a coordinate point of vertical height with a distance of a half of the entrance pupil diameter from the optical axis on the surface along an outline of the surface is denoted as ARE such that the following relations are satisfied: $1.2 \leq HEP \leq 10.0$, $0 < InTL/HOS < 0.9$ and $0.9 \leq 2(ARE/HEP) \leq 1.5$.

2. The optical image capturing system of claim 1, wherein TV distortion for image formation in the optical image capturing system is TDT, a maximum height for image formation on the image plane perpendicular to the optical axis in the optical image capturing system is denoted by HOI, a lateral aberration of the longest operation wavelength of a visible light of a positive direction tangential fan of the optical image capturing system passing through an edge of the entrance pupil and incident on the image plane by 0.7 HOI is denoted as PLTA, and a lateral aberration of the shortest operation wavelength of a visible light of the positive direction tangential fan of the optical image capturing system passing through the edge of the entrance pupil and incident on the image plane by 0.7 HOI is denoted as PSTA, a lateral aberration of the longest operation wavelength of a visible light of a negative direction tangential fan of the optical image capturing system passing through the edge of the entrance pupil and incident on the image plane by 0.7 HOI is denoted as NLTA, a lateral aberration of the shortest operation wavelength of a visible light of a negative direction tangential fan of the optical image capturing system passing through the edge of the entrance pupil and incident on the image plane by 0.7 HOI is denoted as NSTA, a lateral aberration of the longest operation wavelength of a visible light of a sagittal fan of the optical image capturing system passing through the edge of the entrance pupil and incident on the image plane by 0.7 HOI is denoted as SLTA, a lateral aberration of the shortest operation wavelength of a visible light of the sagittal fan of the optical image capturing system passing through the edge of the entrance pupil and incident on the image plane by 0.7 HOI is denoted as SSTA such that the following relations are satisfied: $PLTA \leq 100$ μm; $PSTA \leq 100$ μm; $NLTA \leq 100$ μm; $NSTA \leq 100$ μm; $SLTA \leq 100$ μm; and $SSTA \leq 100$ μm; $|TDT| < 250\%$.

3. The optical image capturing system of claim 1, wherein a maximum effective half diameter position of any surface of any one of the six lens elements is denoted as EHD, and a length of outline curve from an axial point on any surface of any one of the six lens elements to the maximum effective half diameter position of the surface along the outline of the surface is denoted as ARE such that the following relation is satisfied: $0.9 \leq ARS/EHD \leq 2.0$.

4. The optical image capturing system of claim 1, wherein the following relation is satisfied: 0 mm$< HOS \leq 50$ mm.

5. The optical image capturing system of claim 1, wherein a half of a maximum view angle of the optical image capturing system is HAF, and the following relation is satisfied: 0 deg$< HAF \leq 100$ deg.

6. The optical image capturing system of claim 1, wherein a length of outline curve from an axial point on the object-side surface of the sixth lens element to a coordinate point of vertical height with a distance of a half of the entrance pupil diameter from the optical axis on the surface along an outline of the surface is denoted as ARE61 a length of outline curve from an axial point on the image-side surface of the sixth lens element to the coordinate point of vertical height with the distance of a half of the entrance pupil diameter from the optical axis on the surface along the outline of the surface is denoted as ARE62, and a thickness of the sixth lens element on the optical axis is TP6 such that the following relations are satisfied: $0.05 \leq ARE61/TP6 \leq 20$, and $0.05 \leq ARE62/TP6 \leq 20$.

7. The optical image capturing system of claim 1, wherein a length of outline curve from an axial point on the object-side surface of the fifth lens element to a coordinate point of vertical height with a distance of a half of the entrance pupil diameter from the optical axis on the surface along an outline of the surface is denoted as ARE51; a length of outline curve from an axial point on the image-side surface of the fifth lens element to the coordinate point of vertical height with the distance of a half of the entrance pupil diameter from the optical axis on the surface along the outline of the surface is denoted as ARE52, and a thickness of the fifth lens element on the optical axis is TP5 such that the following relations are satisfied: $0.05 \leq ARE51/TP5 \leq 20$; and $0.05 \leq ARE52/TP5 \leq 20$.

8. The optical image capturing system of claim 1, wherein the first lens element has a negative refractive power and is made of glass material.

9. The optical image capturing system of claim 1, further comprising an aperture stop, a distance from the aperture stop to the image plane on the optical axis is InS, and the following relation is satisfied: $0.1 \leq InS/HOS \leq 1.1$.

10. An optical image capturing system, from an object side to an image side, comprising:

a first lens element with negative refractive power;

a second lens element with refractive power;

a third lens element with refractive power;

a fourth lens element with refractive power;

a fifth lens element with refractive power;

a sixth lens element with refractive power; and

an image plane;

wherein the optical image capturing system consists of the six lens elements with refractive power, a maximum height for image formation on the image plane perpendicular to the optical axis in the optical image capturing system is denoted by HOI, at least one lens element among the first through sixth lens elements is made of glass material, at least one of the second through sixth lens elements has positive refractive power, a focal length of the optical image capturing system is f, an entrance pupil diameter of the optical image capturing system is HEP, a distance on an optical axis from an object-side surface of the first lens element to the image plane is HOS, a distance on an optical axis from the object-side surface of the first lens element to the image-side surface of the sixth lens element is InTL, a length of outline curve from an axial point on any surface of any one of the six lens elements to a coordinate point of vertical height with a distance of a half of the entrance pupil diameter from the optical axis on the surface along an outline of the surface is denoted as ARE such that the following relations are satisfied: $1.2 \leq f/HEP \leq 10.0$, $0 < InTL/HOS < 0.9$ and $0.9 \leq 2(ARE/HEP) \leq 1.5$.

11. The optical image capturing system of claim **10**, wherein a maximum effective half diameter position of any surface of any one of the six lens elements is denoted as EHD, and a length of outline curve from an axial point on any surface of any one of the six lens elements to the maximum effective half diameter position of the surface along the outline of the surface is denoted as ARS such that the following relation is satisfied: $0.9 \leq ARS/EHD \leq 2.0$.

12. The optical image capturing system of claim **10**, wherein at least one lens element among the first through sixth lens elements respectively has at least one inflection point on at least one surface thereof.

13. The optical image capturing system of claim **10**, wherein a maximum height for image formation on the image plane perpendicular to the optical axis in the optical image capturing system is denoted by HOI, a lateral aberration of the longest operation wavelength of a visible light of a positive direction tangential fan of the optical image capturing system passing through an edge of the entrance pupil and incident on the image plane by 0.7 HOI is denoted as PLTA, and a lateral aberration of the shortest operation wavelength of a visible light of the positive direction tangential fan of the optical image capturing system passing through the edge of the entrance pupil and incident on the image plane by 0.7 HOI is denoted as PSTA, a lateral aberration of the longest operation wavelength of a visible light of a negative direction tangential fan of the optical image capturing system passing through the edge of the entrance pupil and incident on the image plane by 0.7 HOI is denoted as NLTA, a lateral aberration of the shortest operation wavelength of a visible light of a negative direction tangential fan of the optical image capturing system passing through the edge of the entrance pupil and incident on the image plane by 0.7 HOI is denoted as NSTA, a lateral aberration of the longest operation wavelength of a visible light of a sagittal fan of the optical image capturing system passing through the edge of the entrance pupil and incident on the image plane by 0.7 HOI is denoted as SLTA, a lateral aberration of the shortest operation wavelength of a visible light of the sagittal fan of the optical image capturing system passing through the edge of the entrance pupil and incident on the image plane by 0.7 HOI is denoted as SSTA such that the following relations are satisfied: $PLTA \leq 80$ μm; $PSTA \leq 80$ μm; $NLTA \leq 80$ μm; $NSTA \leq 80$ μm; $SLTA \leq 80$ μm; $SSTA \leq 80$ μm and $HOI > 1.0$ mm.

14. The optical image capturing system of claim **10**, wherein at least one of the first, the second, the third, the fourth, the fifth and the sixth lens elements is a light filtration element with a wavelength of less than 500 nm.

15. The optical image capturing system of claim **10**, wherein a distance between the first lens element and the second lens element on the optical axis is IN12, and the following relation is satisfied: $0 < IN12/f \leq 60.0$.

16. The optical image capturing system of claim **10**, wherein a distance between the fifth lens element and the sixth lens element on the optical axis is IN56, and the following relation is satisfied: $0 < IN56/f < 3.0$.

17. The optical image capturing system of claim **10**, wherein the distance from the fifth lens element to the sixth lens element on the optical axis is IN56, a thickness of the fifth lens element and a thickness of the sixth lens element on the optical axis respectively are TPS and TP6, and the following relation is satisfied: $0.1 \leq (TP6+IN56)/TPS \leq 50$.

18. The optical image capturing system of claim **10**, wherein the distance from the first lens element to the second lens element on the optical axis is IN12 a thickness of the first lens element and a thickness of the second lens element on the optical axis respectively are TPI and TP2, and the following relation is satisfied: $0.1 \leq (TPI+IN12)/TP2 \leq 10$.

19. The optical image capturing system of claim **10**, wherein a distance from the third lens element to the fourth lens element on the optical axis is IN34, a distance from the fourth lens element to the fifth lens element on the optical axis is IN45, a thickness of the fourth lens element is TP4, and the following relation is satisfied: $0 < TP4/(IN34+TP4+IN45) < 1$.

20. An optical image capturing system, from an object side to an image side, comprising:

a first lens element with negative refractive power;
a second lens element with refractive power;
a third lens element with refractive power;
a fourth lens element with refractive power;
a fifth lens element with refractive power;
a sixth lens element with refractive power; and
an image plane; wherein the optical image capturing system consists of the six lens elements with refractive power, a maximum height for image formation on the image plane perpendicular to the optical axis in the optical image capturing system is denoted by HOI, at least three lens elements among the first through sixth lens elements are made of glass material, an object-side surface and an image-side surface of at least one of the six lens elements are aspheric, a focal length of the optical image capturing system is f, an entrance pupil diameter of the optical image capturing system is HEP, a half of maximum view angle of the optical image capturing system is HAF, a distance on an optical axis from an object-side surface of the first lens element to the image plane is HOS, a distance on an optical axis from the object-side surface of the first lens element to the image-side surface of the sixth lens element is InTL, a length of outline curve from an axial point on any surface of any one of the six lens elements to a coordinate point of vertical height with a distance of a half of the entrance pupil diameter from the optical axis on the surface along an outline of the surface is denoted as ARE such that the following relations are satisfied: $1.2 \leq f/HEP \leq 3.5$; $0.4 \leq |\tan(HAF)| \leq 6.0$; $0 < InTL/HOS < 0.9$; and $0.9 \leq 2(ARE/HEP) \leq 1.5$.

21. The optical image capturing system of claim **20**, wherein a maximum effective half diameter position of any surface of any one of the six lens elements is denoted as EHD, and a length of outline curve from an axial point on any surface of any one of the six lens elements to the maximum effective half diameter position of the surface along the outline of the surface is denoted as ARS such that the following relation is satisfied: $0.9 \leq ARS/EHD \leq 2.0$.

22. The optical image capturing system of claim **20**, wherein the following relation is satisfied: 0 mm$<HOS \leq 50$ mm.

23. The optical image capturing system of claim **20**, wherein a length of outline curve from an axial point on the object-side surface of the sixth lens element to a coordinate point of vertical height with a distance of a half of the entrance pupil diameter from the optical axis on the surface along an outline of the surface is denoted as ARE61; a length of outline curve from an axial point on the image-side surface of the sixth lens element to the coordinate point of vertical height with the distance of a half of the entrance pupil diameter from the optical axis on the surface along the outline of the surface is denoted as ARE62, and a thickness of the sixth lens element on the optical axis is TP6 such that the following relations are satisfied: $0.05 \leq ARE61/TP6 \leq 20$ and $0.05 \leq ARE62/TP6 \leq 20$.

24. The optical image capturing system of claim **20**, wherein a length of outline curve from an axial point on the object-side surface of the fifth lens element to a coordinate point of vertical height with a distance of a half of the entrance pupil diameter from the optical axis on the surface along an outline of the surface is denoted as ARE51; a length of outline curve from an axial point on the image-side surface of the fifth lens element to the coordinate point of vertical height with the distance of a half of the entrance pupil diameter from the optical axis on the surface along the outline of the surface is denoted as ARE52, and a thickness of the fifth lens element on the optical axis is TP5 such that the following relations are satisfied: $0.05 \leq ARE51/TP5 \leq 20$ and $0.05 \leq ARE52/TP5 \leq 20$.

25. The optical image capturing system of claim **20**, wherein the optical image capturing system further comprise an aperture stop, an image sensing device and a driving module, the image sensing device is disposed on the image plane, a distance from the aperture stop to the image plane is InS, and the driving module couples with the lens elements to displace the lens elements and wherein following relation is satisfied: $0.1 \leq InS/HOS \leq 1.1$.

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